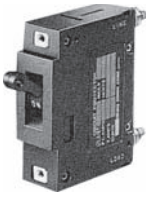
Circuit Protectors

Circuit Protector Selection Guide

Type		NH1S	NH1Y	NH1L	NH1V
Appearance		 Lever Type	 Rocker Type	 Rocker Type •With indicator	 Lever Type •DIN rail/Surface mounting
Tripping Method		Hydraulic-magnetic tripping			
No. of Poles		1 to 3 poles (Dual-coil type: 1-pole, 2-pole)	1, 2 poles	1, 2 poles	1 to 3 poles
Internal Circuit	Series Trip/Current Trip	Yes	Yes	Yes	Yes
	Relay Trip/Voltage Trip	Yes	Yes	Yes	Yes
	Dual-coil Type	Yes	–	–	–
Rating	Rated Voltage	250V AC 50/60 Hz, 65V DC			
	Rated Current (Current Trip)	Current trip: 0.5A to 30A Dual-coil type: 2A to 15A			
	Trip Voltage (Voltage Trip)	100V AC, 24V DC (Dual-coil type: 24V DC, 100V AC)			
	Rated Interrupting Capacity	250V AC/65V DC 1000A (UL/CSA rating), 220V AC 50/60Hz 1000A ( )			
Time Delay Curves		2 types for DC, 3 types for AC			
Auxiliary Contacts/Alarm Contacts		With	With auxiliary contact	With auxiliary contact	With
Inertia Delay		With	With	With	With
Mounting Style		Panel cut-out (Screw mounting)	Panel cut-out (Snap-on mounting)		DIN rail mounting, Surface mounting
Dimensions (H × W × D mm, 1-pole)		42 × 16 × 45	55 × 22 × 60		58.7 × 16 × 56
Certification		UL, c-UL, VDE, ,	UL, c-UL, VDE, , ,	UL, c-UL, VDE, ,	UL, c-UL, VDE, ,
Page		**1127**	**1127**	**1127**	**1127**

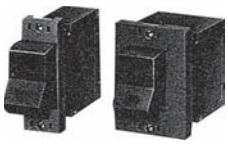
Note: See the following pages for further information about the certified products.

Type		NRBM	NRLT	NRLP	NRLY	NRLY (Illuminated Type)
Appearance			 Lever Type	 Lever Type	 Rocker Type	 (LED/Neon) Illuminated Rocker Type
Tripping Method		Hydraulic-magnetic tripping				
No. of Poles		1 to 3 poles	1, 2 poles (1-lever)	1 pole	1, 2 poles (1-rocker)	1, 2 poles (1-rocker)
Internal Circuit	Series Trip/Current Trip	Yes	Yes	Yes	Yes	Yes
	Relay Trip/Voltage Trip	–	Yes	–	Yes	Yes
	Switch Type	–	Yes	–	Yes	Yes
Rating	Rated Voltage	250V AC, 50/60Hz, 65V DC	250V AC 50/60Hz, 50V DC			
	Rated Current (Current Trip)	1A to 50A	0.5A to 20A			
	Trip Voltage (Voltage Trip)	–	100V AC, 24V DC			
	Rated Interrupting Capacity	250V AC/65V DC 1000A	250V AC/750A (UL rating: 1000A), 50V DC/500A (UL rating: 1000A)			
Time Delay Curves		2 types for DC, 3 types for AC	3 types for DC 3 types for AC			
Auxiliary Contacts/Alarm Contacts		With	With auxiliary contact	With auxiliary contact	With auxiliary contact	With auxiliary contact
Inertia Delay		With	With	With	With	With
Mounting Style		Panel cut-out (Screw mounting)	Panel cut-out (Ring mounting)	PC board	Panel cut-out (Snap-on mounting)	Panel cut-out (Snap-on mounting)
Dimensions (H × W × D mm, 1-pole)		63 × 19.1 × 63.5	36.6 × 16.8 × 42	36.6 × 16.8 × 46	50.8 × 22 × 46	50.8 × 22 × 46
Certification		UL, c-UL, VDE, ,	UL, CSA, VDE, *,	UL, CSA, VDE,	UL, CSA, VDE, *, ,	UL, CSA, VDE, *,
Page		**1163**	**1151**	**1151**	**1151**	**1151**

Note: See the following pages for further information about the certified products.

* Protectors indicated with are for the switch type.
Also, the series trip and relay trip types of NRL series are excluded from .

	NRAS	NRAN	NRAR	NRAR (Illuminated Type)
	 Lever Type	 Lever Type	 Rocker Type	 (LED) (Neon Lamp) Illuminated Rocker Type
	Hydraulic-magnetic tripping			
	1 to 3 poles	1 to 3 poles	1 pole	1 pole
	Yes	Yes	Yes	Yes
	Yes	Yes	–	–
	–	–	–	–
	250V AC 50/60 Hz, 65V DC			
	0.3A to 30A			
	24V DC			
	250V AC/65V DC, 1000A			
	2 types for DC, 3 types for AC			
	With	With	With	With
	With	With	With	With
	Panel cut-out (Screw mounting, snap-on mounting), Surface mounting (Plug-in base), DIN rail mounting (Width: 35 mm)			Panel cut-out (Screw mounting), Panel cut-out (Snap-on mounting)
	50.7 × 19.1 × 54.5	50.7 × 19.1 × 50.5	52 × 19 × 65.5	52 × 19 × 65.5
	UL, c-UL, VDE,	UL, c-UL, VDE,	UL, c-UL, VDE,	UL, c-UL, VDE,
	1139	**1139**	**1139**	**1139**

	NRLR	NRLR (Illuminated Type)	NRLK	NRC	NRC□L
	 Rocker Type	 (LED/Neon) Illuminated Rocker Type	 Large Rocker Type	 Slide Type	 Lever Type
	Hydraulic-magnetic tripping			Hydraulic-magnetic tripping	
	1, 2 poles (1-rocker)	1, 2 poles (1-rocker)	1, 2 poles (1-rocker)	1 pole	1, 2 poles
	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	–	–
	Yes	Yes	Yes	–	–
	250V AC 50/60Hz, 50V DC			250V AC 50/60Hz, 65V DC	
	Current trip: For 0.5A to 20A			For 0.3A to 30A	
	100V AC, 24V DC			–	–
	250V AC/750A (UL rating: 1000A), 50V DC/500A (UL rating: 1000A)			220V AC/2500A (2-pole: 1500A), 65V DC/1500A (2-pole: 750A)*	
	3 types for DC, 3 types for AC			2 types for DC, 2 types for AC	
	With auxiliary contact	With auxiliary contact	With auxiliary contact	With auxiliary contact	
	With	With	With	–	
	Panel cut-out (Screw mounting)	Panel cut-out (Screw mounting)	Panel cut-out (Screw mounting)	Surface mounting (Screw mounting) DIN rail mounting (Width: 35 mm) Panel cut-out (Bracket mounting)	
	44 × 16.8 × 46	44 × 16.8 × 46	44 × 16.8 × 44	68 × 25 × 64 (Housing depth)	
	UL, CSA, VDE, * ,	UL, CSA, VDE, * ,	UL, CSA, VDE, * ,	UL, CSA,	
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Note: UL and CSA ratings may differ. See the following pages for details.

(Continued on the next page)

Circuit Protector Selection Guide

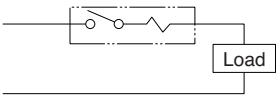
Type		NRF1	NRF2	NRPS	NRPF
Appearance			With manual OFF mechanism 	Slim 	Flat 
Tripping method		Thermal tripping			
No. of Poles		1 pole		1 pole (SPST-NC, SPDT)	
Internal Circuit (Current Trip)		Series Trip		Series trip	
Rating	Maximum Circuit Voltage	32V DC, 250V AC		32V DC, 250V AC	
	Rated Current	300, 500mA 1, 2, 3, 5, 8, 10, 15A		1, 1.6, 2, 3.15, 4, 5, 6A	
	Rated Interrupting Capacity	300 mA to 5A: Rated current × 6 10, 15A: Rated current × 10		1A to 4A: Rated current × 10 (resistive load) 5A, 6A: 250V AC/40A, 32V DC/40A (resistive load)	
	Tripping Time	No trip at the rated current Within 1 hour at 135% the rated current		No trip at the rated current Within 2 min at 175% the rated current	
	Reset Time	1 min minimum (*1)		1 min minimum (at 200% the rated current) (*1)	
Time Delay Curves		1 type		1 type	
Auxiliary Contacts		With		–	
Mounting Style		Panel cut-out (Snap-on mounting)		PC board mounting	
Certification		UL, CSA, TÜV (*2),	UL,	UL, CSA	
Page		1173		1176	

*1: Reset time is the value at the reference ambient temperature of 25°C.
*2: TÜV certification: for 8A, 10A and 15A only.

Common Description of Circuit Protectors
Internal Circuit Overview and Application Examples

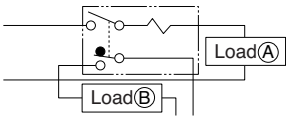
Series Trip

This is the most common circuit protector, providing excellent overload and short circuit protection. It can also be used as ON/OFF switch, except NRF and NRP series.



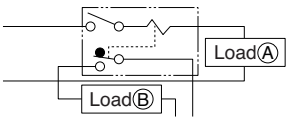
Series Trip with Auxiliary Contacts

As the auxiliary contact operation is interlocked with the ON/OFF of the main contactor, circuit protector operation can be monitored by a lamp. The auxiliary contact can also be used to control auxiliary circuits.



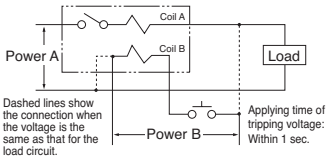
Series Trip with Alarm Contacts

The alarm contact is electrically independent of the ON/OFF of the main contactor, but actuates when the protective element operates. Therefore, the alarm contact can be used with a lamp or buzzer to indicate trip operation and control alarm circuits. After the alarm contact has tripped, turn the lever ON to set the alarm contact.



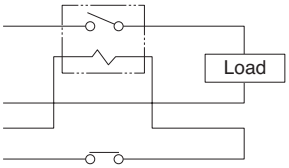
Dual-coil Type

The dual coil type circuit protector is provided with both a series trip (current trip) and relay trip (voltage trip). In the following example circuit, Coil A (current coil) performs overload and short circuit protection, while Coil B (voltage coil) serves to shut down the circuit when the alarm contact detects an abnormal condition.



Relay Trip/Voltage Trip

The internal structure is identical to the current tripping protector, but the protective element has no time-delay function and the load circuit is cut off by the instantaneous tripping of the protector. Suitable for purposes, such as cutting off the power supply by using the alarm signal of the secondary circuit of the transformer.



•Applications by Time Delay Curve

Time Delay Curves	Applications
Curve AD Curve AA	The most common curves used for circuit breakers.
Curve MD Curve MA	Suited for motor loads that draw high inrush currents lasting for a rather long period of time.
With inertia delay (Inertia delay mechanism)	Suited for transformer and lamp loads that draw steep inrush currents.

Wide Range of Applications from Office Automation and Consumer Use to Factory Automation.

- Compact, lightweight, and high-performance circuit protectors.
- Rocker type snaps into a panel.
- Rated voltage: 250V AC and 65V DC
- 35mm-wide DIN rail mounting (NH1V)
- Available with dual-coil type
- Available with auxiliary contact or alarm contacts.
- Available with inertia delay
- Hydraulic-magnetic tripping system
- Safe trip-free mechanism
- Available in tab terminal type and screw-terminal type.

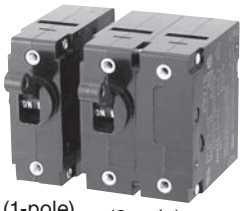
This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector."

Applicable Standards	Certification Mark	Certification Organization / File No.
UL1077 CSA C22.2 No. 235 (Note 1)	c UL us	UL/c-UL File No. E68029
EN60934 (VDE0642) (Note 2)	VDE	No. 107852
GB17701	CCC	CCC No. 2005010307152360
Electrical Appliance and Material Safety Law Technical Standard	PS E	JET

For details, see the list of standard certified products in the back of this catalog.
Note 1: Series trip, relay trip, dual coil (for AC)
Note 2: Series trip

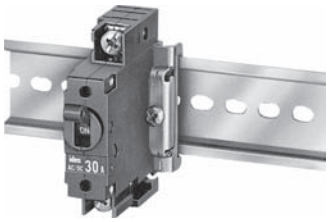
• Rocker Type
NH1Y

• Rocker Type
NH1L
(w/indicator)



(1-pole) (2-pole)

• Lever Type
NH1S

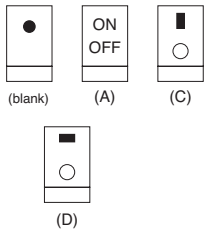


• Lever Type
NH1V
(Direct DIN rail mounting type)

Specifications

Type	NH1S	NH1Y	NH1L	NH1V	Dual-coil Type NH1S
Operator Style	Lever	Rocker	Rocker (w/indicator)	Lever	Lever
Protection Method	Hydraulic-magnetic tripping system				Hydraulic-magnetic tripping system
Internal Circuit	Series trip (Current trip) Relay trip (Voltage trip)	Series trip with auxiliary contacts		Series trip with alarm contacts (NH1S and NH1V only)	Series trip (Current trip) + Relay trip (Voltage trip)
No. of Poles	1, 2, 3 poles	1, 2 poles	1, 2 poles	1, 2, 3 poles	1, 2 poles
Rated Voltage	250V AC 50/60Hz, 65V DC				250V AC 50/60Hz, 65V DC
Minimum Applicable Load	24V AC/DC, 100mA (reference value)				
Rated Current	Current trip: 0.5A, 0.75A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A				Current trip: 2A, 3A, 5A, 7.5A, 10A, 15A
Trip Voltage	100V AC 50/60Hz, 24V DC (operating at 90% of the rated voltage or higher, at 25ºC) Voltage application duration: 1 sec maximum Trip time: 0.05 sec maximum (at the rated voltage)				External trip coil voltage: 24V DC, 100V AC (operating at 90% of the rated voltage or higher, at 25ºC) Voltage application duration: 1 sec max. Trip time: 0.05 sec max. (at the rated voltage)
Rated Interrupting Capacity	250V AC 50/60Hz 1000A, 65V DC 1000A (UL/C-UL ratings) 220V AC 50/60Hz 1000A (VDE)				
Auxiliary Contact Alarm Contact	SPDT microswitch 250V AC, 3A (resistive load)				–
Reference Temperature	+25ºC				
Operating Temperature	−40 to +85ºC (no freezing)				
Operating Humidity	45 to 85% RH (no condensation)				
Insulation Resistance	100 MΩ minimum (500V DC megger)				
Dielectric Strength	Between operator and live part, between terminals when main contacts are open, between live parts of different poles, and between main terminal and auxiliary contact terminal: 3750V AC, 1 min (NH1V: 1500V AC, 1 min) Between terminals when auxiliary contacts are open: 600V AC, 1 min				Between operator and live part, between terminals when main contacts are open, between live parts of different poles, between voltage trip terminal and main terminal: 1500V AC, 1 min.
Vibration Resistance	100 m/s^2 (10 to 100Hz) with the rated current applied				
Shock Resistance	Damage limits: 1000 m/s^2, Operating extremes: 500 m/s^2 with the rated current applied. (Auxiliary/alarm contact: 300 m/s^2)				
Life	10,000 cycles min. (Electrically 6,000 cycles: 6 operations per minute at the rated current, mechanically 4,000 cycles: 6 operations per minute)				
Terminal Style	Main terminal: Tab terminal #250, M4 screw terminal Auxiliary terminal: Tab terminal #110			Main terminal: M4 screw terminal (20A max.) M5 screw terminal (25, 30A) Auxiliary terminal: M3.5 screw terminal	Main terminal: Tab terminal #250 Auxiliary terminal: Tab terminal #187
Mounting Style	Screw mounting	Snap mounting		Screw mounting, DIN rail mounting	Screw mounting
Weight (Approx.)	1-pole type: 45g 2-pole type: 90g 3-pole type: 135g	1-pole type: 50g 2-pole type: 100g		1-pole type: 65g 2-pole type: 130g 3-pole type: 195g	1-pole type: 45g 2-pole type: 90g

• Rocker Color, Rocker Indication (NH1Y/NH1L)

Rocker Color (Code)	Black (blank) Red (R), Green (G), White (W)
Rocker Indication (Code)	

• Operating Voltage of Indicator (NH1L)

Indicator	Rated Voltage		Code
Neon (Red)	125V AC, 50/60Hz (operating voltage: 100 to 125V AC)		1
LED (Red) [Note]	For AC/DC (operating voltage: within +10% of the rated voltage)	6V	3
		12V	4
		24V	5
		48V	6

Note: Both types of indicators contain a current-limiting resistor.

• Lever Color (NH1S, NH1V): Black

• Operation of Auxiliary Contacts

Since auxiliary contact operations are interlocked with ON/OFF positions of main terminal, operating status of the circuit protector can be monitored using a lamp. Auxiliary contacts also serve as a control of auxiliary circuits.

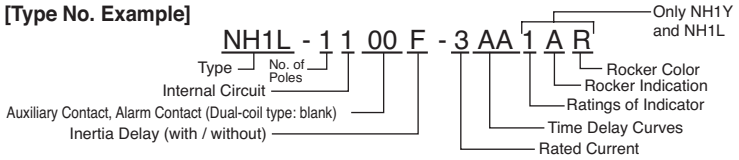
Operator Position	NO Contact	NC Contact
ON	Closed	Open
Tripped	Open	Closed
OFF	Open	Closed

• Operation of Alarm Contacts

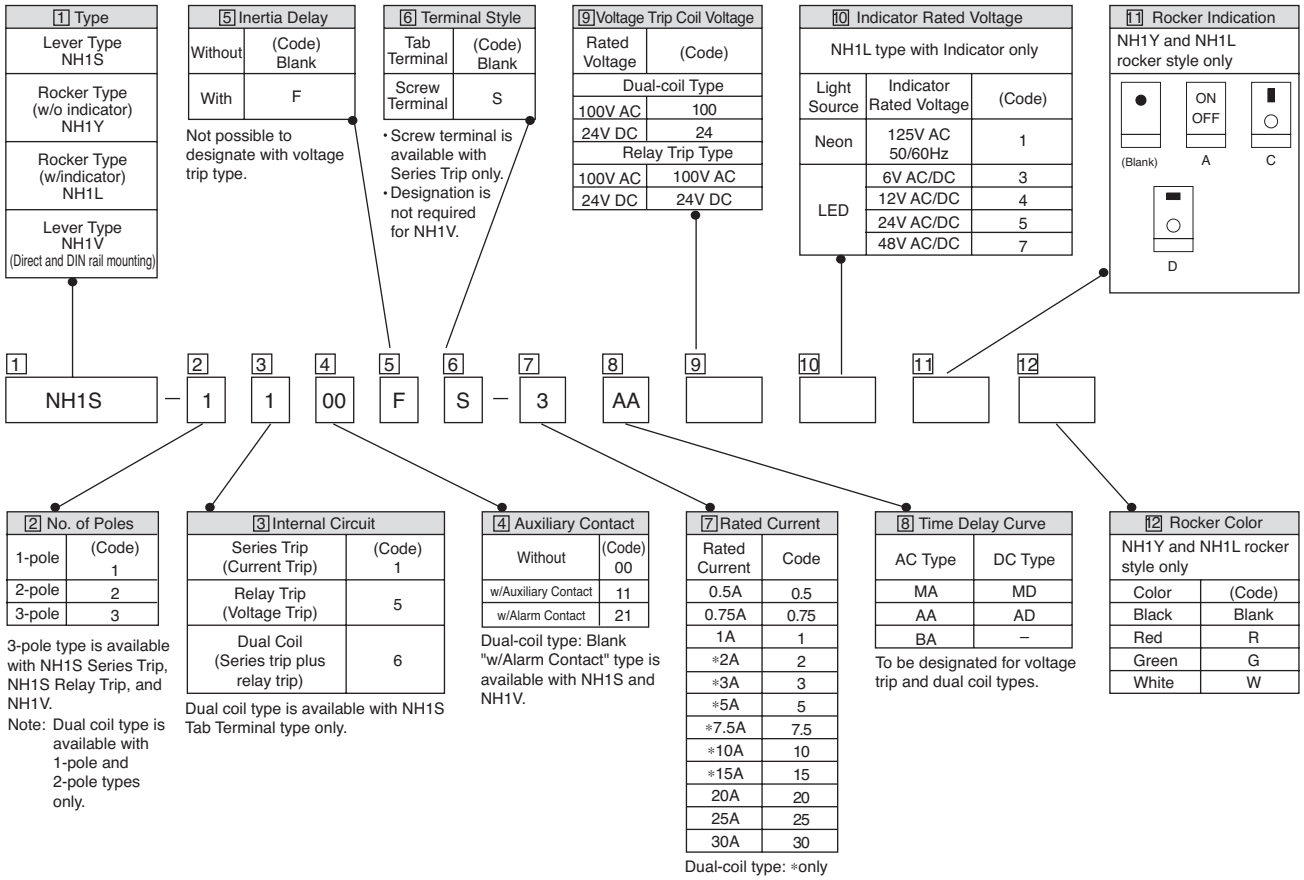
Alarm contacts are not interlocked with main contacts and operate only when an overcurrent occurs.

Operator Position	NO Contact	NC Contact
ON	Open	Closed
Tripped	Closed	Open
OFF	Open	Closed

[Type No. Example]



Type No. Development



NH1S (Lever Type) Type No.

• Specify a rated current, time delay curve, and rated voltage in place of 7 8 9.

Package Quantity: 1

Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code		
						7 Rated Current	8 Time Delay Curve	9 Rated Voltage
Series Trip Current Trip	1	Tab Terminal	Without	Without	NH1S-1100- 7 8	0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
				w/Auxiliary Contact	NH1S-1111- 7 8			
				w/Alarm Contact	NH1S-1121- 7 8			
			With	Without	NH1S-1100F- 7 8			
				w/Auxiliary Contact	NH1S-1111F- 7 8			
				w/Alarm Contact	NH1S-1121F- 7 8			
		Screw Terminal	Without	Without	NH1S-1100S- 7 8			
				w/Auxiliary Contact	NH1S-1111S- 7 8			
				w/Alarm Contact	NH1S-1121S- 7 8			
			With	Without	NH1S-1100FS- 7 8			
				w/Auxiliary Contact	NH1S-1111FS- 7 8			
				w/Alarm Contact	NH1S-1121FS- 7 8			
Series Trip Current Trip	2	Tab Terminal	Without	Without	NH1S-2100- 7 8			
				w/Auxiliary Contact	NH1S-2111- 7 8			
				w/Alarm Contact	NH1S-2121- 7 8			
			With	Without	NH1S-2100F- 7 8			
				w/Auxiliary Contact	NH1S-2111F- 7 8			
				w/Alarm Contact	NH1S-2121F- 7 8			
		Screw Terminal	Without	Without	NH1S-2100S- 7 8			
				w/Auxiliary Contact	NH1S-2111S- 7 8			
				w/Alarm Contact	NH1S-2121S- 7 8			
			With	Without	NH1S-2100FS- 7 8			
				w/Auxiliary Contact	NH1S-2111FS- 7 8			
				w/Alarm Contact	NH1S-2121FS- 7 8			
Series Trip Current Trip	3	Tab Terminal	Without	Without	NH1S-3100- 7 8			
				w/Auxiliary Contact	NH1S-3111- 7 8			
				w/Alarm Contact	NH1S-3121- 7 8			
			With	Without	NH1S-3100F- 7 8			
				w/Auxiliary Contact	NH1S-3111F- 7 8			
				w/Alarm Contact	NH1S-3121F- 7 8			
		Screw Terminal	Without	Without	NH1S-3100S- 7 8			
				w/Auxiliary Contact	NH1S-3111S- 7 8			
				w/Alarm Contact	NH1S-3121S- 7 8			
			With	Without	NH1S-3100FS- 7 8			
				w/Auxiliary Contact	NH1S-3111FS- 7 8			
				w/Alarm Contact	NH1S-3121FS- 7 8			
Relay Trip Voltage Trip	1	Tab Terminal	Without	Without	NH1S-1500- 9	–	–	100V AC 24V DC
	2			Without	NH1S-2500- 9			
	3			Without	NH1S-3500- 9			
Dual-coil Type	1	Tab Terminal	Without	Without	NH1S-16- 7 8 9	2A 3A 5A 7.5A 10A 15A	AA BA MA AD MD	100V AC 24V DC
			With		NH1S-16F- 7 8 9			
	2	Tab Terminal	Without	Without	NH1S-26- 7 8 9			
			With		NH1S-26F- 7 8 9			

NH1Y (Rocker Type) Type No.

• Specify a rated current, time delay curve, rated voltage, rocker indication, and rocker color in place of 7 8 9 11 12.

Package Quantity: 1

Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code				
						7 Rated Current	8 Time Delay Curve	9 Rated Voltage	11 Rocker Indication	12 Rocker Color
Series Trip Current Trip	1	Tab Terminal	Without	Without	NH1Y-1100- 7 8 11 12	0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–	Blank, A, C, D	Blank, R, G, W
				w/Auxiliary Contact	NH1Y-1111- 7 8 11 12					
				w/Alarm Contact	–					
			With	Without	NH1Y-1100F- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-1111F- 7 8 11 12					
				w/Alarm Contact	–					
		Screw Terminal	Without	Without	NH1Y-1100S- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-1111S- 7 8 11 12					
				w/Alarm Contact	–					
			With	Without	NH1Y-1100FS- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-1111FS- 7 8 11 12					
				w/Alarm Contact	–					
Series Trip Current Trip	2	Tab Terminal	Without	Without	NH1Y-2100- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-2111- 7 8 11 12					
				w/Alarm Contact	–					
			With	Without	NH1Y-2100F- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-2111F- 7 8 11 12					
				w/Alarm Contact	–					
		Screw Terminal	Without	Without	NH1Y-2100S- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-2111S- 7 8 11 12					
				w/Alarm Contact	–					
			With	Without	NH1Y-2100FS- 7 8 11 12					
				w/Auxiliary Contact	NH1Y-2111FS- 7 8 11 12					
				w/Alarm Contact	–					
Relay Trip Voltage Trip	1	Tab Terminal	Without	Without	NH1Y-1500- 9 11 12	–	–	100V AC 24V DC	Blank, A, C, D	Blank, R, G, W
	2			Without	NH1Y-2500- 9 11 12					
	–			–	–					

NH1L (Rocker Type) Type No.

• Specify a rated current, time delay curve, rated voltage, indicator, rocker indicator, and rocker color in place of 7 8 9 10 11 12.

Package Quantity: 1

Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code					
						7 Rated Current	8 Time Delay Curve	9 Rated Voltage	10 Indicator	11 Rocker Indication	12 Rocker Color
Series Trip Current Trip	1	Tab Terminal	Without	Without	NH1L-1100- 7 8 10 11 12	0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–	1: Neon 125V AC 50/60Hz 3: LED 6V AC/DC 4: LED 12V AC/DC 5: LED 24V AC/DC 7: LED 48V AC/DC	Blank, A, C, D	Blank, R, G, W
				w/Auxiliary Contact	NH1L-1111- 7 8 10 11 12						
				w/Alarm Contact	–						
			With	Without	NH1L-1100F- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-1111F- 7 8 10 11 12						
				w/Alarm Contact	–						
		Screw Terminal	Without	Without	NH1L-1100S- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-1111S- 7 8 10 11 12						
				w/Alarm Contact	–						
			With	Without	NH1L-1100FS- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-1111FS- 7 8 10 11 12						
				w/Alarm Contact	–						
Series Trip Current Trip	2	Tab Terminal	Without	Without	NH1L-2100- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-2111- 7 8 10 11 12						
				w/Alarm Contact	–						
			With	Without	NH1L-2100F- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-2111F- 7 8 10 11 12						
				w/Alarm Contact	–						
		Screw Terminal	Without	Without	NH1L-2100S- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-2111S- 7 8 10 11 12						
				w/Alarm Contact	–						
			With	Without	NH1L-2100FS- 7 8 10 11 12						
				w/Auxiliary Contact	NH1L-2111FS- 7 8 10 11 12						
				w/Alarm Contact	–						
Relay Trip Voltage Trip	1	Tab Terminal	Without	Without	NH1L-1500- 9 10 11 12	–	–	100V AC 24V DC	1: Neon 125V AC 50/60Hz 3: LED 6V AC/DC 4: LED 12V AC/DC 5: LED 24V AC/DC 7: LED 48V AC/DC	Blank, A, C, D	Blank, R, G, W
	2			Without	NH1L-2500- 9 10 11 12						
	–			–	–						

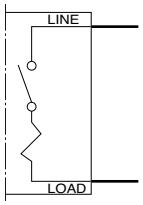
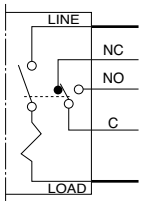
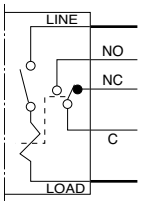
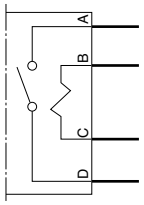
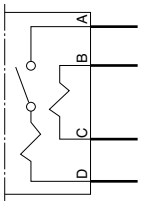
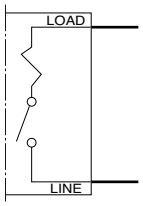
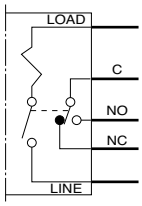
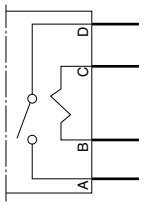
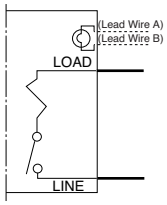
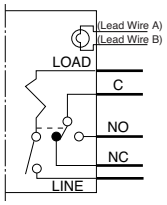
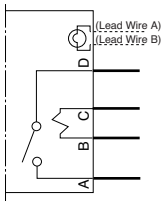
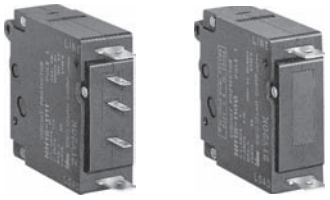
NH1V (Lever Type) Type No.

• Specify a rated current, time delay curve, and rated voltage in place of 7 8 9.

Package Quantity: 1

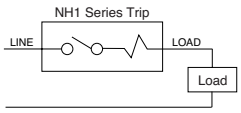
Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Code for Ordering		
					7 Rated Current	8 Time Delay Curve	9 Rated Voltage
Series Trip Current Trip	1	Without	Without	NH1V-1100- 7 8	0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
			w/Auxiliary Contact	NH1V-1111- 7 8			
			w/Alarm Contact	NH1V-1121- 7 8			
		With	Without	NH1V-1100F- 7 8			
			w/Auxiliary Contact	NH1V-1111F- 7 8			
			w/Alarm Contact	NH1V-1121F- 7 8			
	2	Without	Without	NH1V-2100- 7 8			
			w/Auxiliary Contact	NH1V-2111- 7 8			
			w/Alarm Contact	NH1V-2121- 7 8			
		With	Without	NH1V-2100F- 7 8			
			w/Auxiliary Contact	NH1V-2111F- 7 8			
			w/Alarm Contact	NH1V-2121F- 7 8			
	3	Without	Without	NH1V-3100- 7 8			
			w/Auxiliary Contact	NH1V-3111- 7 8			
			w/Alarm Contact	NH1V-3121- 7 8			
		With	Without	NH1V-3100F- 7 8			
			w/Auxiliary Contact	NH1V-3111F- 7 8			
			w/Alarm Contact	NH1V-3121F- 7 8			
Relay Trip Voltage Trip	1	Without	Without	NH1V-1500- 9	–	–	100V AC 24V DC
	2		Without	NH1V-2500- 9			
	3		Without	NH1V-3500- 9			

Internal Circuits and Terminal Arrangements

Type	Series Trip (Current Trip)	Series Trip (w/auxiliary contact)	Series Trip (w/alarm contact)	Relay Trip (Voltage Trip)	Dual Coil Type Series Trip + Relay Trip (Voltage Trip)
NH1S					
NH1Y			–		–
NH1L w/indicator			–		–
Appearance (Rear View)	 (Photo: NH1S)				

Note: The 2-pole type with auxiliary or alarm contact has the contacts on the left side as viewed from the front.
The 3-pole type with auxiliary and alarm contacts has the contacts on the center.
See the dimensional drawings for the terminal arrangement.

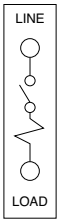
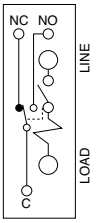
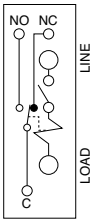
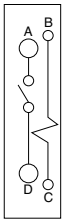
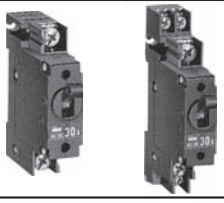
• Wiring Example



• Lead Wires for Neon and LED Indicators:

Lead Wire	Color	Neon	LED
Lead wire A	Red	AC	Positive
Lead wire B	Black	AC	Negative

• NH1V

Type	Series Trip (Current Trip)	Series Trip (w/auxiliary contact)	Series Trip (w/alarm contact)	Relay Trip (Voltage Trip)
NH1V				
Appearance				

Note: See the dimensional drawings for the terminal arrangement.

Overcurrent - Time Delay Characteristics (sec at 25ºC) [at vertical mounting]

For	Time Delay Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
AC 50/60Hz	AA	No Trip	12-180	6-70	2-25	0.15-3.5	0.005-0.3	0.004-0.13	0.004-0.04
	BA	No Trip	0.7-15	0.3-4	0.1-1.3	0.02-0.25	0.006-0.13	0.003-0.07	0.003-0.04
	MA	No Trip	50-800	20-300	5.5-110	0.3-17	0.008-2.5	0.004-0.5	0.004-0.1
DC	AD	No Trip	10-180	6-75	2.6-30	0.5-7	0.015-3	0.004-0.8	0.003-0.1
	MD	No Trip	70-800	25-300	10-100	1.2-20	0.02-5	0.004-0.65	0.003-0.1

Note: Circuit protectors with inertia delay may have a slightly longer time delay at 400% or higher.

•Dual Coil Type

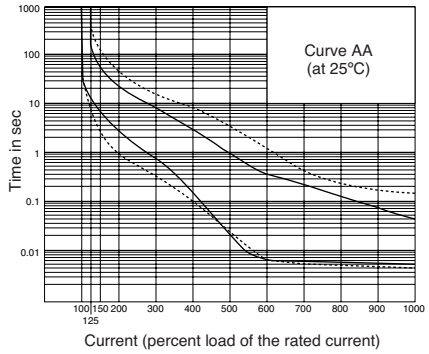
For	Time Delay Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
AC 50/60Hz	AA	No trip	6-500	2-150	0.7-40	0.1-8	0.005-1.2	0.003-0.2	0.003-0.15
	BA	No trip	0.7-60	0.25-20	0.07-6	0.013-1.2	0.004-0.4	0.003-0.2	0.003-0.15
	MA	No trip	50-800	15-600	6-250	0.4-40	0.06-3	0.003-0.2	0.003-0.15
DC	AD	No trip	10-180	1.5-100	0.6-30	0.1-7	0.015-3	0.004-0.8	0.003-0.1
	MD	No trip	70-800	14-600	5-200	0.8-40	0.007-20	0.003-4	0.003-0.1

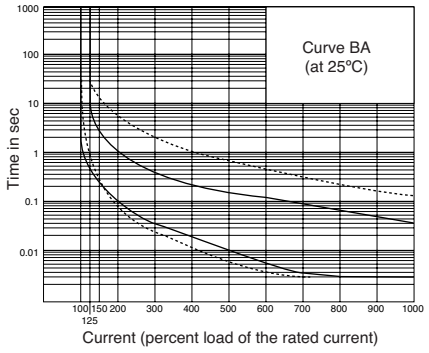
Note: Circuit protectors with inertia delay may have a slightly longer time delay at 400% or higher.

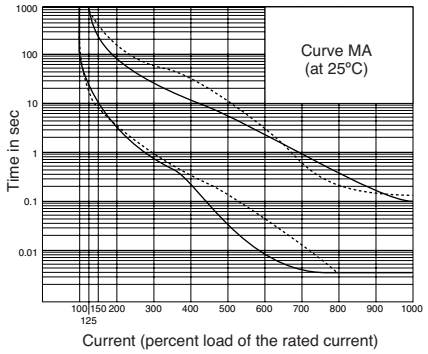
Time Delay Curves

Note: The dashed lines show dual coil type.

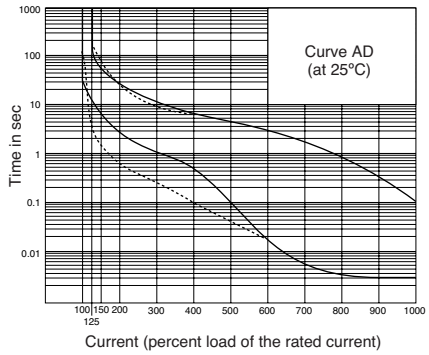
For AC

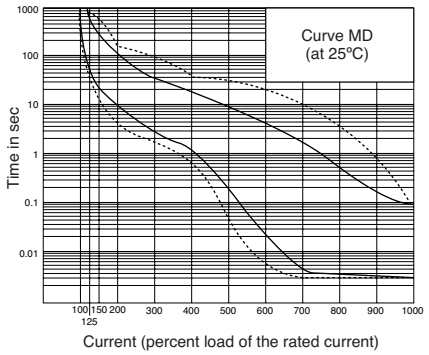






For DC



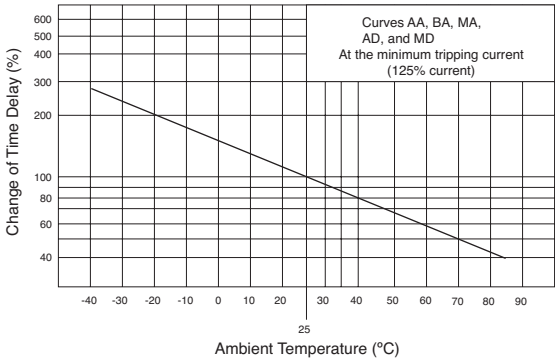


Time Delay Curve and Ambient Temperature

Since NH1 series circuit protectors employ an electromagnetic tripping system, the rated current (trip current) is not affected by ambient temperatures but the time delay varies with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in shorter delay, whereas at lower temperatures the delay will be prolonged. The time delay curves on the preceding page are at 25ºC. With reference to these curves, time delays can be corrected.

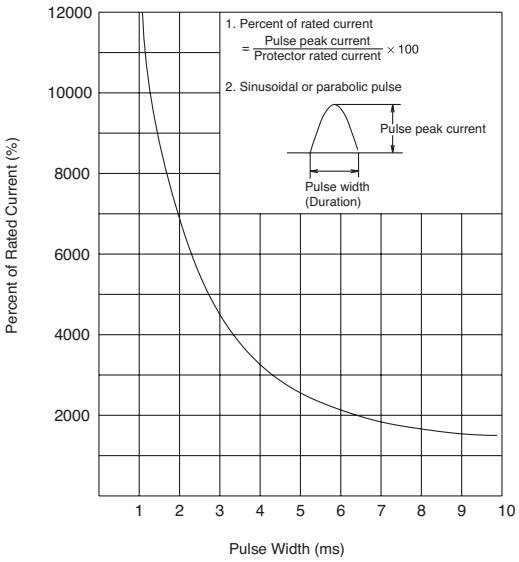
Temperature Correction Curve

The time delay curves are at 25ºC. With reference to the following figure, time delays can be corrected.



Circuit Protector with Inertia Delay

1. Circuit protectors equipped with inertia delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on the subsequent overcurrents.
2. Inertia delay is designed not to trip on a pulse of 1500% the rated current for a duration of 10 ms.



Impedance and Coil Resistance

• Series Trip Type
[Current Trip Type]

Rated Current	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)	Rated Current	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
	Curves AA, BA, and MA	Curves AD and MD		Curves AA, BA, and MA	Curves AD and MD
0.5A	3.36	3.24	7.5A	0.018	0.017
0.75A	1.49	1.45	10A	0.012	0.012
1A	0.92	0.90	15A	0.0068	0.0066
2A	0.21	0.21	20A	0.0048	0.0048
2.5A	0.13	0.13	25A	0.0043	0.0043
3A	0.092	0.09	30A	0.0041	0.0036
5A	0.036	0.036			

Note: Tolerance: ±25% (up to 5A), ±50% (7.5A or higher)

• Relay Trip Type
[Voltage Trip Type]

Rated Voltage	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
100V AC	1350	–
24V DC	–	248

• Dual Coil Type
[Current Trip Type]

Rated Current	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
	Curves AA, BA, and MA	Curves AD and MD
2A	0.308	0.307
3A	0.129	0.127
5A	0.0509	0.0518
7.5A	0.0249	0.0245
10A	0.0150	0.0150
15A	0.0084	0.0080

Note: Tolerance: ±25% (up to 5A), ±50% (7.5A or higher)

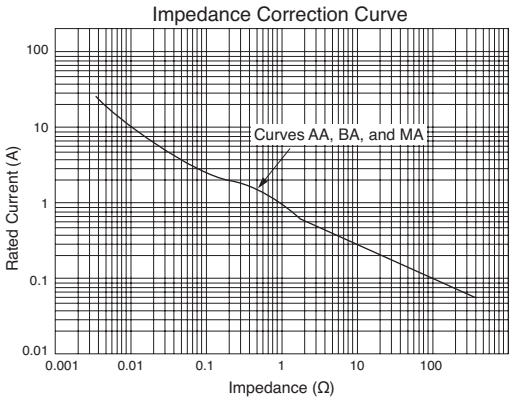
[Voltage Trip Type]

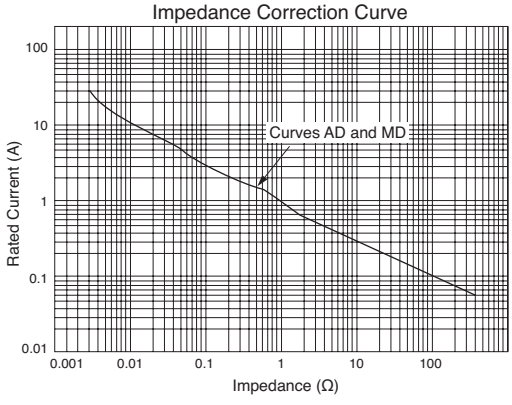
Rated Voltage	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
100V AC	321	–
24V DC	–	15.7

Note: 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 in spite of the same rated current, which should also be considered during installation.

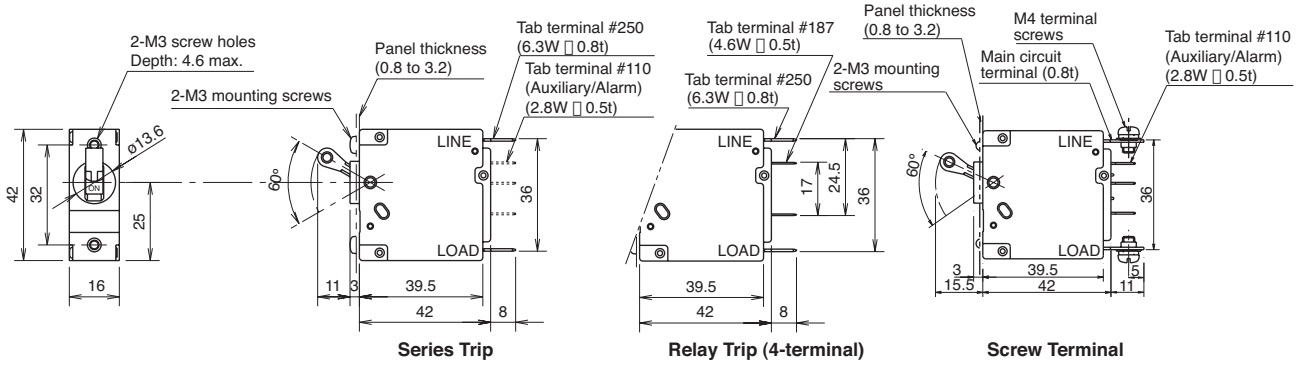




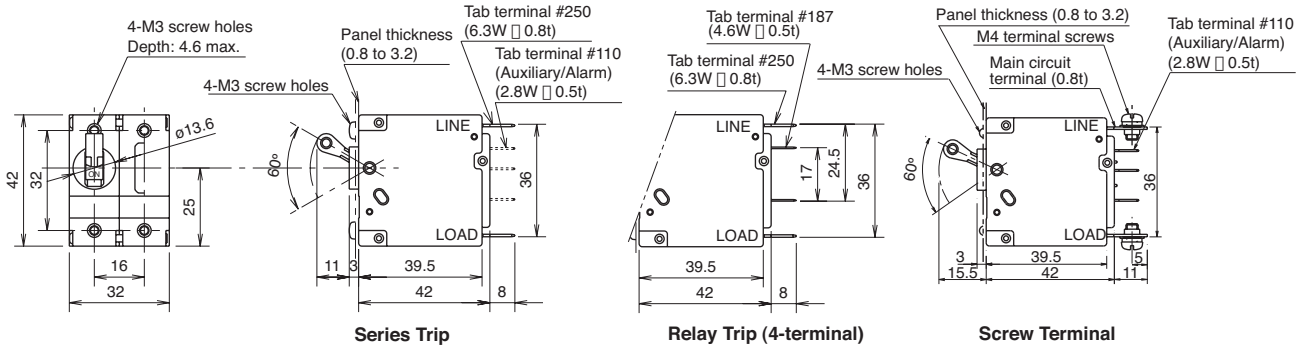
Dimensions

[NH1S]

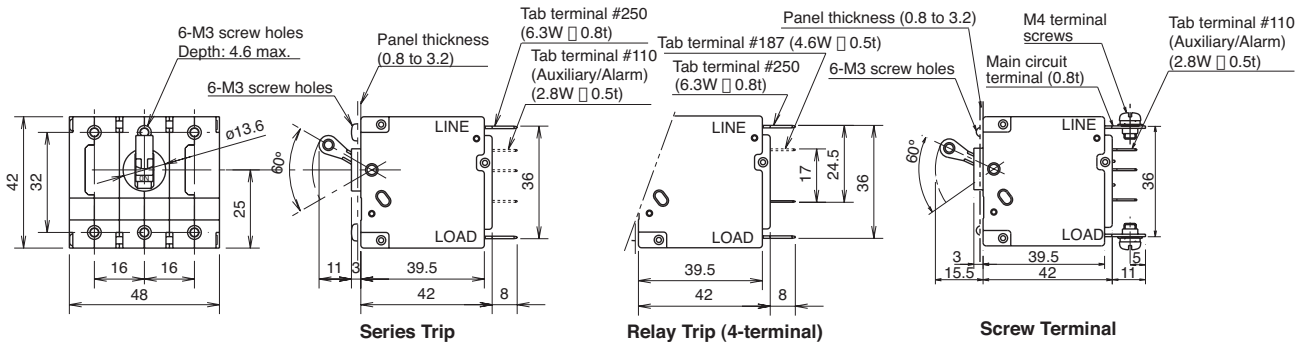
•1-pole Type



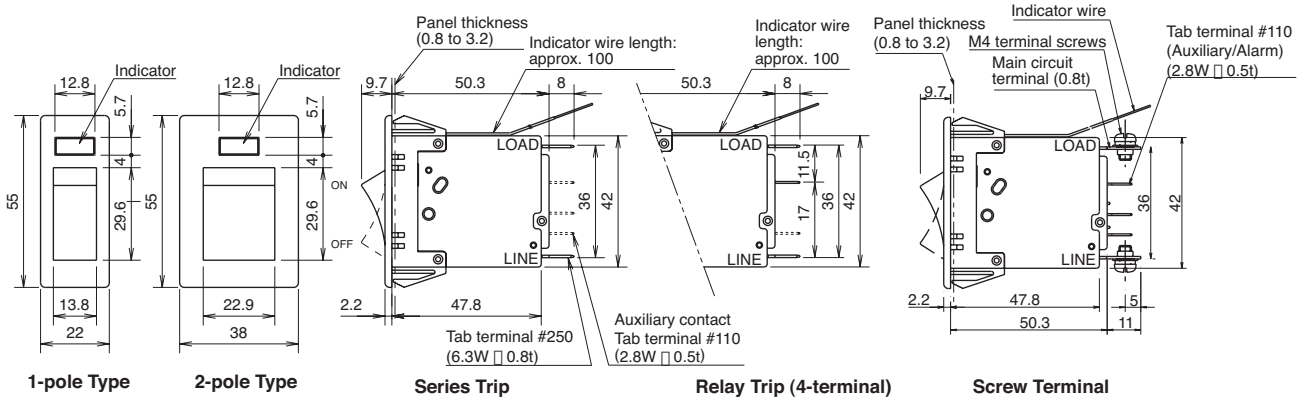
•2-pole Type



•3-pole Type



[NH1Y • NH1L]

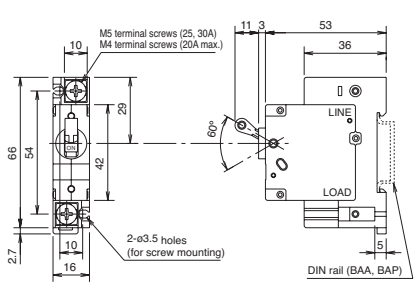


All dimensions in mm.

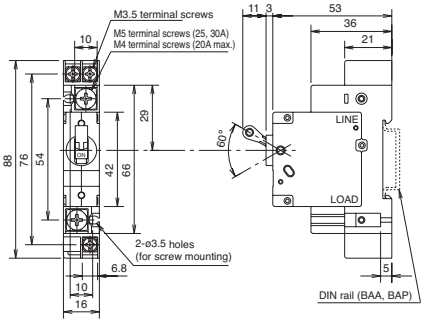
Dimensions

[NH1V]

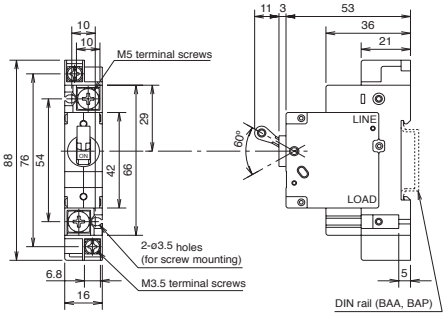
•1-pole Type



Series Trip

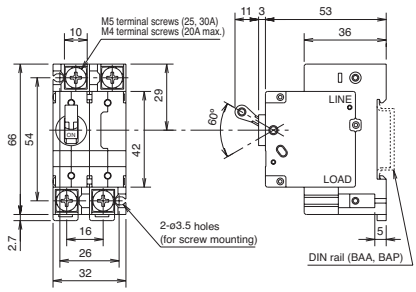


Series Trip (Auxiliary/Alarm Contacts)

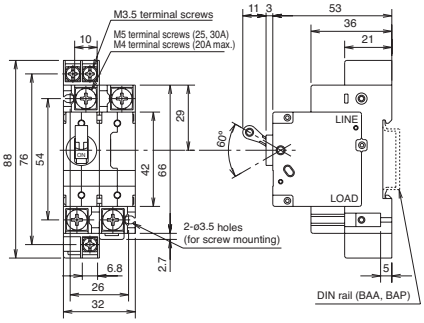


Relay Trip

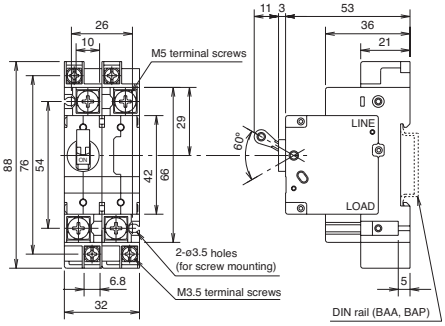
•2-pole Type



Series Trip

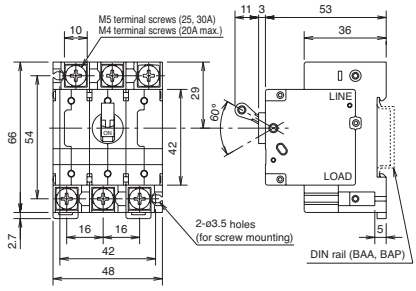


Series Trip (Auxiliary/Alarm Contacts)

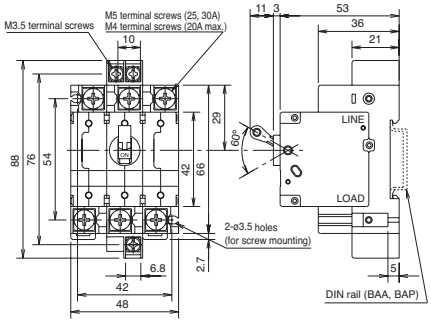


Relay Trip

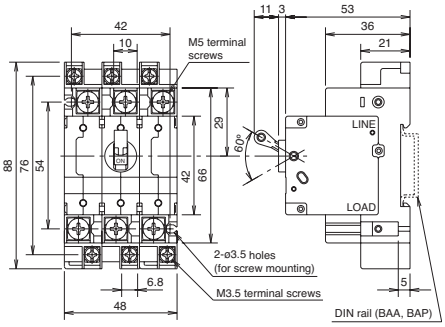
•3-pole Type



Series Trip

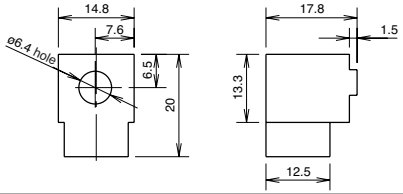
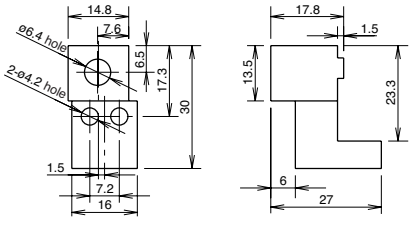


Series Trip (Auxiliary/Alarm Contacts)



Relay Trip

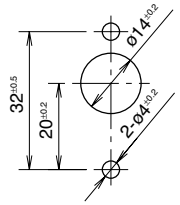
Accessories (Optional)

Product / Appearance	Type No.	Ordering Type No.	Package Quantity	Description / Dimensions
• **Terminal Cover** (for main terminals) for NH1V   Material: Polyamide	NH9Z-A	NH9Z-APN02	2	Two pieces are required for 1 unit. 
• **Terminal Cover** (for main/auxiliary terminals) for NH1V   Material: Polyamide	NH9Z-B	NH9Z-BPN02	2	Two pieces are required for 1 unit. 

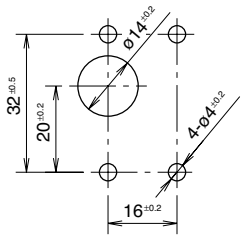
Mounting Hole Layout

[NH1S]

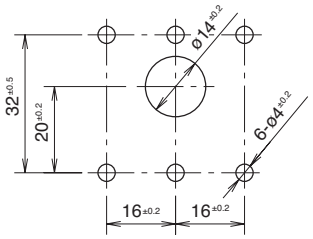
•1-pole Type



•2-pole Type

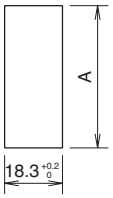


•3-pole Type

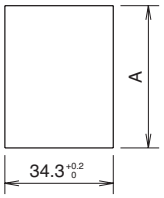


[NH1Y • NH1L]

•1-pole Type



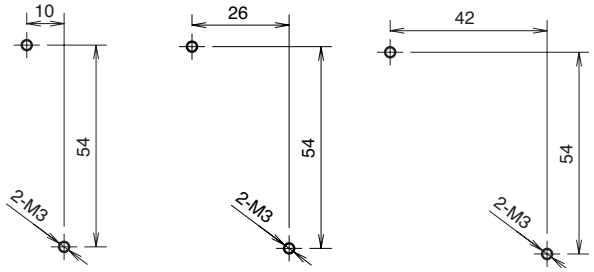
•2-pole Type



- Determine the dimension A within the panel thickness using the following formula:
  Dimension A (mm) = 50.4+(Panel thickness−0.8) × 0.87
  Applicable panel thickness: 0.8 to 3.2 mm

[NH1V]

•1-pole Type **•2-pole Type** **•3-pole Type**



•Panel Mounting Screw Length

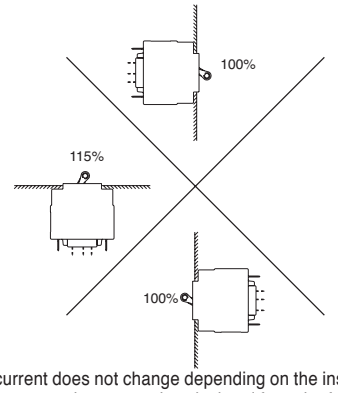
Select the screw length with reference to the following table.

Panel thickness (mm)	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	3.2
Without washer	5	5	5	6	6	6	6	6	7	7
With plain washer (0.5 mm thick)	5	6	6	6	6	6	7	7	7	8
With spring washer (0.7 mm thick)	6	6	6	6	6	7	7	7	7	8
With plain washer (0.5 mm thick) and spring washer (0.7 mm thick)	6	6	7	7	7	7	7	8	8	8

M3 screw mounting
Tightening torque: 0.5 N•m minimum
Tightening strength: 0.7 N•m

•Installation Angle

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



Note 1: The rated current does not change depending on the installation angle.
Note 2: The minimum operating current is calculated from the following formula:
(Minimum operating current) = (Rated current) × 125% × (Correction factor by installation angle)

Instructions

One-pole type circuit protectors cannot be combined to make 2- or 3-pole units due to their characteristics. Order multi-pole types from IDEC.

•Recommended Soldering Conditions

Solder the main terminal at a temperature of 390ºC within 10 seconds using a 60W soldering iron.
Solder the auxiliary/alarm terminal at a temperature of 350ºC within 3 seconds using a 60W soldering iron. (Sn-Ag-Cu lead-free solder is recommended.)
When soldering, do not touch the circuit protector housing, auxiliary and alarm contacts with the soldering iron, and do not bend the terminals or pull the wires.
Check your actual soldering conditions before soldering.

•Main Circuit Terminal: Screw terminal

1. Applicable wire size	1.25 to 5.5 mm^2
2. Applicable crimping terminal	R1.25-4 to R5.5-4
3. No.of crimping terminal	1
4. Tightening torque	1.0 to 1.2 N•m
5. Tensile strength (Static 1 minute)	Axial direction: 80N Transverse direction: 20N

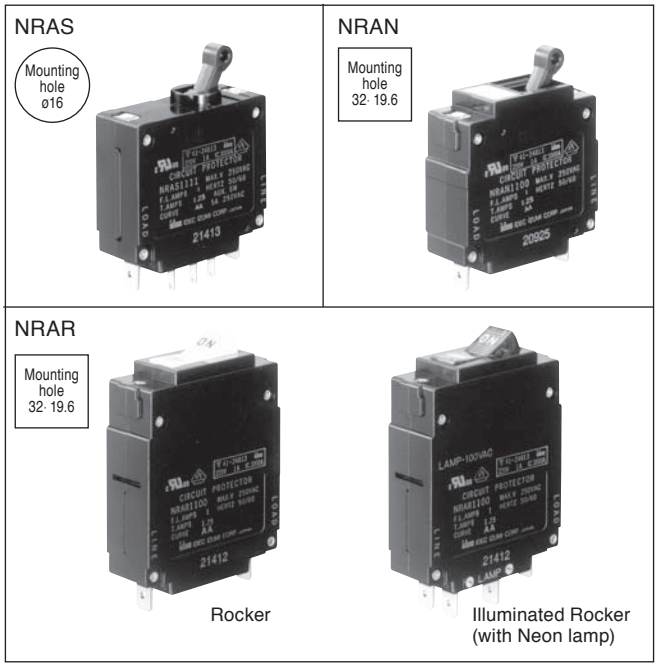
Thrust force (screw pressing load) in screw tightening should be 29N or less. The screw driver may slip out depending on the shape type and conditions. In this case, hold the terminal with a tool and tighten the screw by applying a thrust force of about 50N without deforming the terminal.

Best Selling Circuit Protectors
Wide selection of applications ranging from computers to office and factory automation

- Available with inertia delay
- Available with auxiliary contact or alarm contact
- Hydraulic-magnetic tripping system
- Safe trip-free mechanism
- Vibration-proof design
- Variety of mounting methods
- IEC(IEC 60934) compliant
- Available in tab-terminal type and screw-terminal type suited for crimping-terminal wiring.

Applicable Standards	Certification Mark	Certification Organization / File No.
UL1077 CSA C22.2 No. 235 (Note 1)	c UL us	UL/c-UL File No. E68029
EN60934 (VDE0642) (Note 2)	VDE PR HOUSE MARK	No. 116381
GB17701	CCC	CCC No. 2005010309151792
Electrical Appliance and Material Safety Law Technical Standard	PS E	JET

For details, see the list of standard certified products in the back of this catalog.
Note 1: All standard models
Note 2: All models



Specifications

Type	NRAS	NRAN	NRAR
Operator Style	Lever	Lever	Rocker (Non-illuminated, Illuminated)
Protection Method	Hydraulic-magnetic tripping system		
Internal Circuit	Series trip (current trip) Relay trip (voltage trip) Series trip (current trip) with auxiliary contacts Series trip (current trip) with alarm contacts		
No. of poles	1, 2, 3 poles		1 pole
Rated Voltage	250V AC 50/60Hz, 65V DC		
Minimum Applicable Load	24V AC/DC, 100 mA (reference value)		
Rated Current	Current trip: 0.3A, 0.5A, 0.75A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A		
Trip Voltage (Voltage trip)	Rated voltage: 24V DC (operating at 90% of the rated voltage or higher, at 25°C) Voltage application duration: 1 sec maximum Trip time: 0.05 sec maximum (at the rated voltage)		
Rated Interrupting Capacity	250V AC 50/60Hz 1000A, 65V DC 1000A		
Auxiliary Contact Alarm Contact	SPDT microswitch 250V AC 5A (resistive load), 50V DC 1A (resistive load)		
Reference Temperature	+25°C		
Operating Temperature	−40 to +85°C (no freezing)		
Operating Humidity	45 to 85% RH (no condensation)		
Insulation Resistance	100 MΩ minimum (500V DC megger)		
Dielectric Strength	2000V AC for 1 minute (between live part and ground, between terminals of different poles, between terminals of the same poles when main contacts are open, between main circuit and auxiliary contact)		
Vibration Resistance	100 m/s^2 (10 to 100Hz)		
Shock Resistance	1000 m/s^2		
Life	Over 10,000 operations (6 operations per minute)		
Terminal Style	Main terminal: Tab terminal #250, M4 screw terminal Auxiliary contact/Alarm contact: Tab terminal #110		
Weight (Approx.) (NRAS series trip)	1-pole type: 60g 2-pole type: 125g 3-pole type: 190g		

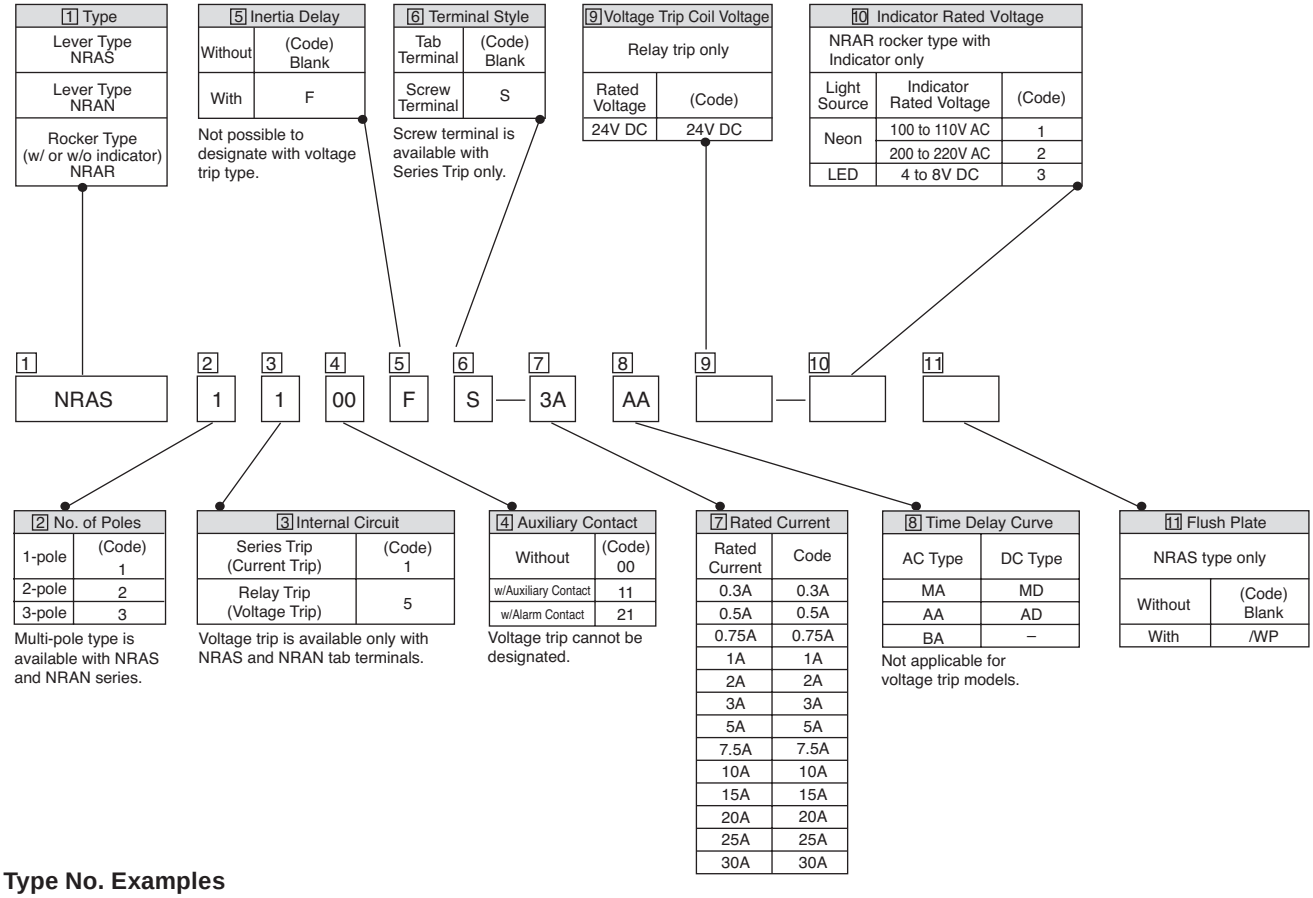
Indicator Ratings (Illuminated rocker unit)

Indicator	Rated Voltage
Neon	100 to 110V AC, 50/60Hz 200 to 220V AC, 50/60Hz
LED	4 to 8V DC

Standard Color

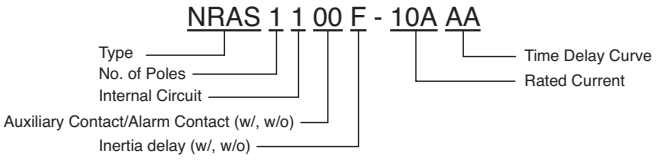
Housing		Black	
Lever (NRAS-,NRAN)		Black with white letters, ON-OFF, I/O	
Rocker Color, Indicator Color (NRAR)		Rocker Color	Indicator Color
	Non-illuminated	Opaque white	–
	with Neon lamp	Transparent red	Red

Type No. Development

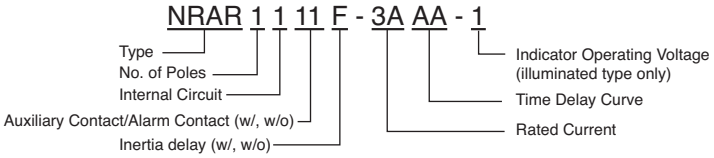


Type No. Examples

(1) Circuit protector: Lever type



(2) Circuit Protector: Illuminated rocker type



NRAS (Lever Type)

Specify a rated current, time delay curve, and rated voltage in place of 7 8 9.

Package Quantity: 1

Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Flush Plate	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code		
							7 Rated Current	8 Time Delay Curve	9 Rated Voltage
Series Trip Current Trip	1	Tab Terminal	Without	Without	Without	NRAS1100- 7 8	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
					w/Auxiliary Contact	NRAS1111- 7 8			
					w/Alarm Contact	NRAS1121- 7 8			
				With	Without	NRAS1100- 7 8 /WP			
					w/Auxiliary Contact	NRAS1111- 7 8 /WP			
					w/Alarm Contact	NRAS1121- 7 8 /WP			
			With	Without	Without	NRAS1100F- 7 8			
					w/Auxiliary Contact	NRAS1111F- 7 8			
					w/Alarm Contact	NRAS1121F- 7 8			
				With	Without	NRAS1100F- 7 8 /WP			
					w/Auxiliary Contact	NRAS1111F- 7 8 /WP			
					w/Alarm Contact	NRAS1121F- 7 8 /WP			
		Screw Terminal	Without	Without	Without	NRAS1100S- 7 8			
					w/Auxiliary Contact	NRAS1111S- 7 8			
					w/Alarm Contact	NRAS1121S- 7 8			
				With	Without	NRAS1100S- 7 8 /WP			
					w/Auxiliary Contact	NRAS1111S- 7 8 /WP			
					w/Alarm Contact	NRAS1121S- 7 8 /WP			
			With	Without	Without	NRAS1100FS- 7 8			
					w/Auxiliary Contact	NRAS1111FS- 7 8			
					w/Alarm Contact	NRAS1121FS- 7 8			
				With	Without	NRAS1100FS- 7 8 /WP			
					w/Auxiliary Contact	NRAS1111FS- 7 8 /WP			
					w/Alarm Contact	NRAS1121FS- 7 8 /WP			
Series Trip Current Trip	2	Tab Terminal	Without	Without	Without	NRAS2100- 7 8	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
					w/Auxiliary Contact	NRAS2111- 7 8			
					w/Alarm Contact	NRAS2121- 7 8			
				With	Without	NRAS2100- 7 8 /WP			
					w/Auxiliary Contact	NRAS2111- 7 8 /WP			
					w/Alarm Contact	NRAS2121- 7 8 /WP			
			With	Without	Without	NRAS2100F- 7 8			
					w/Auxiliary Contact	NRAS2111F- 7 8			
					w/Alarm Contact	NRAS2121F- 7 8			
				With	Without	NRAS2100F- 7 8 /WP			
					w/Auxiliary Contact	NRAS2111F- 7 8 /WP			
					w/Alarm Contact	NRAS2121F- 7 8 /WP			
		Screw Terminal	Without	Without	Without	NRAS2100S- 7 8			
					w/Auxiliary Contact	NRAS2111S- 7 8			
					w/Alarm Contact	NRAS2121S- 7 8			
				With	Without	NRAS2100S- 7 8 /WP			
					w/Auxiliary Contact	NRAS2111S- 7 8 /WP			
					w/Alarm Contact	NRAS2121S- 7 8 /WP			
			With	Without	Without	NRAS2100FS- 7 8			
					w/Auxiliary Contact	NRAS2111FS- 7 8			
					w/Alarm Contact	NRAS2121FS- 7 8			
				With	Without	NRAS2100FS- 7 8 /WP			
					w/Auxiliary Contact	NRAS2111FS- 7 8 /WP			
					w/Alarm Contact	NRAS2121FS- 7 8 /WP			

NRAS (Lever Type)

Specify a rated current, time delay curve, and rated voltage in place of 7 8 9.

Package Quantity: 1

Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Flush Plate	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code		
							7 Rated Current	8 Time Delay Curve	9 Rated Voltage
Series Trip Current Trip	3	Tab Terminal	Without	Without	Without	NRAS300- 7 8	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
					w/Auxiliary Contact	NRAS3111- 7 8			
					w/Alarm Contact	NRAS3121- 7 8			
			With	Without	Without	NRAS3100F- 7 8			
					w/Auxiliary Contact	NRAS3111F- 7 8			
					w/Alarm Contact	NRAS3121F- 7 8			
		Screw Terminal	Without	Without	Without	NRAS3100S- 7 8			
					w/Auxiliary Contact	NRAS3111S- 7 8			
					w/Alarm Contact	NRAS3121S- 7 8			
			With	Without	Without	NRAS3100FS- 7 8			
					w/Auxiliary Contact	NRAS3111FS- 7 8			
					w/Alarm Contact	NRAS3121FS- 7 8			
Relay Trip Voltage Trip	1	Tab Terminal	Without	Without	Without	NRAS1500- 9	–	–	24V DC
	2				Without	NRAS2500- 9			
	3				Without	NRAS3500- 9			

NRAN (Lever Type)

Specify a rated current, time delay curve, and rated voltage in place of 7 8 9. Package Quantity: 1

Series Trip Current Trip	No. of Poles	Terminal Style	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code		
						7 Rated Current	8 Time Delay Curve	9 Rated Voltage
Series Trip Current Trip	1	Tab Terminal	Without	Without	NRAN1100- 7 8	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
				w/Auxiliary Contact	NRAN1111- 7 8			
				w/Alarm Contact	NRAN1121- 7 8			
			With	Without	NRAN1100F- 7 8			
				w/Auxiliary Contact	NRAN1111F- 7 8			
				w/Alarm Contact	NRAN1121F- 7 8			
		Screw Terminal	Without	Without	NRAN1100S- 7 8			
				w/Auxiliary Contact	NRAN1111S- 7 8			
				w/Alarm Contact	NRAN1121S- 7 8			
			With	Without	NRAN1100FS- 7 8			
				w/Auxiliary Contact	NRAN1111FS- 7 8			
				w/Alarm Contact	NRAN1121FS- 7 8			
Series Trip Current Trip	2	Tab Terminal	Without	Without	NRAN2100- 7 8			
				w/Auxiliary Contact	NRAN2111- 7 8			
				w/Alarm Contact	NRAN2121- 7 8			
			With	Without	NRAN2100F- 7 8			
				w/Auxiliary Contact	NRAN2111F- 7 8			
				w/Alarm Contact	NRAN2121F- 7 8			
		Screw terminal	Without	Without	NRAN2100S- 7 8			
				w/Auxiliary Contact	NRAN2111S- 7 8			
				w/Alarm Contact	NRAN2121S- 7 8			
			With	Without	NRAN2100FS- 7 8			
				w/Auxiliary Contact	NRAN2111FS- 7 8			
				w/Alarm Contact	NRAN2121FS- 7 8			
Series Trip Current Trip	3	Tab terminal	Without	Without	NRAN3100- 7 8			
				w/Auxiliary Contact	NRAN3111- 7 8			
				w/Alarm Contact	NRAN3121- 7 8			
			With	Without	NRAN3100F- 7 8			
				w/Auxiliary Contact	NRAN3111F- 7 8			
				w/Alarm Contact	NRAN3121F- 7 8			
		Screw Terminal	Without	Without	NRAN3100S- 7 8			
				w/Auxiliary Contact	NRAN3111S- 7 8			
				w/Alarm Contact	NRAN3121S- 7 8			
			With	Without	NRAN3100FS- 7 8			
				w/Auxiliary Contact	NRAN3111FS- 7 8			
				w/Alarm Contact	NRAN3121FS- 7 8			
Relay Trip Voltage Trip	1	Tab Terminal	Without	Without	NRAN1500- 9	–	–	24V DC
	2			Without	NRAN2500- 9			
	3			Without	NRAN3500- 9			

NRAR (Rocker Type)

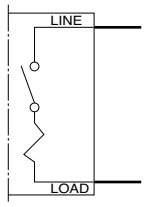
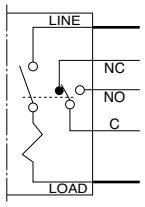
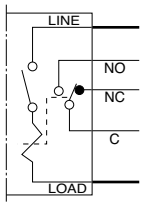
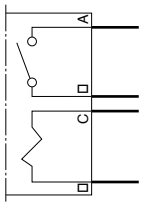
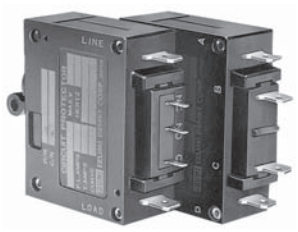
Specify a rated current, time delay curve, and indicator rated voltage in place of 7 8 10

Package Quantity: 1

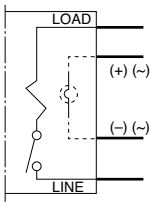
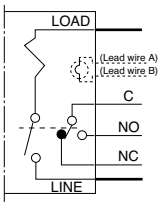
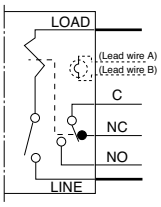
Illuminated Type	Internal Circuit	No. of Poles	Terminal Style	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Designation Code		
							7 Rated Current	8 Time Delay Curve	10 Indicator Rated Voltage
Illuminated	Series Trip Current Trip	1	Tab Terminal	Without	Without	NRAR1000- 7 8 - 10	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	1: Neon 100 to 110V AC 2: Neon 200 to 220V AC 3: LED 4 to 8V DC
					w/Auxiliary Contact	NRAR1111- 7 8 - 10			
					w/Alarm Contact	NRAR1121- 7 8 - 10			
				With	Without	NRAR1100F- 7 8 - 10			
					w/Auxiliary Contact	NRAR1111F- 7 8 - 10			
					w/Alarm Contact	NRAR1121F- 7 8 - 10			
			Screw Terminal	Without	Without	NRAR1100S- 7 8 - 10			
					w/Auxiliary Contact	NRAR1111S- 7 8 - 10			
					w/Alarm Contact	NRAR1121S- 7 8 - 10			
				With	Without	NRAR1100FS- 7 8 - 10			
					w/Auxiliary Contact	NRAR1111FS- 7 8 - 10			
					w/Alarm Contact	NRAR1121FS- 7 8 - 10			
Non-illuminated	Series Trip Current Trip	1	Tab Terminal	Without	Without	NRAR1100- 7 8	0.3A 0.5A 0.75A 1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A	AA BA MA AD MD	–
					w/Auxiliary Contact	NRAR1111- 7 8			
					w/Alarm Contact	NRAR1121- 7 8			
				With	Without	NRAR1100F- 7 8			
					w/Auxiliary Contact	NRAR1111F- 7 8			
					w/Alarm Contact	NRAR1121F- 7 8			
			Screw Terminal	Without	Without	NRAR1100S- 7 8			
					w/Auxiliary Contact	NRAR1111S- 7 8			
					w/Alarm Contact	NRAR1121S- 7 8			
				With	Without	NRAR1100FS- 7 8			
					w/Auxiliary Contact	NRAR1111FS- 7 8			
					w/Alarm Contact	NRAR1121FS- 7 8			

Internal Circuits

NRAS and NRAN

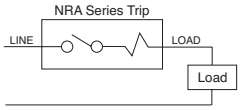
Series Trip (Current Trip)	Series Trip (Current Trip) With Auxiliary Contact	Series Trip (Current Trip) With Alarm Contact	Relay Trip (Voltage Trip)	
				

NRAR Dashed lines show the illuminated rocker type.

Series Trip (Current Trip)	Series Trip (Current Trip) With Auxiliary Contact	Series Trip (Current Trip) With Alarm Contact	–	
			–	

Indicator terminals on the illuminated rocker type
Indicator terminals are available only on the series trip type without auxiliary and alarm contacts.
Auxiliary and alarm contacts are provided with color-coded lead wires as shown in the table at right.

Wiring Example



Indicator		Lead Wire	
		A	B
Neon (for AC)	100 to 110V	White	White
	200 to 220V	Black	Black
LED (for DC)	Positive	Black	–
	Negative	–	White

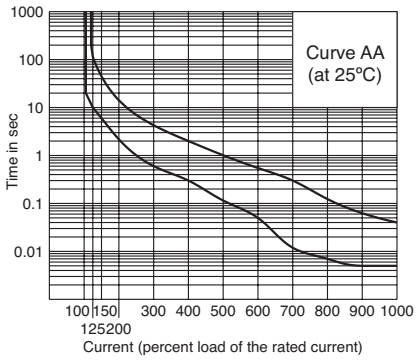
Overcurrent - Time Delay Characteristics (sec at 25ºC)

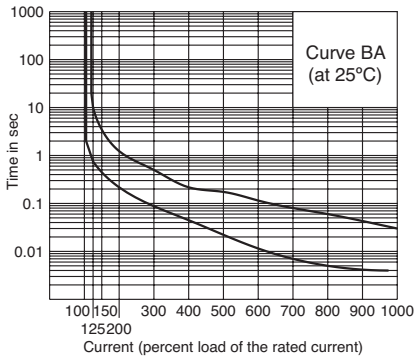
For	Time Delay Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
AC 50/60Hz	AA	No Trip	10-120	6-45	2.2-15	0.3-2	0.05-0.55	0.007-0.13	0.005-0.04
	BA	No Trip	0.75-10	0.45-3.5	0.22-1.3	0.045-0.22	0.012-0.12	0.005-0.06	0.004-0.03
	MA	No Trip	60-900	30-260	9-70	1.5-8	0.18-2.5	0.009-0.25	0.006-0.08
DC	AD	No Trip	10-130	6-55	2.6-20	0.5-3.5	0.12-1.4	0.008-0.1	0.005-0.05
	MD	No Trip	35-400	20-200	7-60	1.3-8	0.2-3	0.01-0.25	0.006-0.08

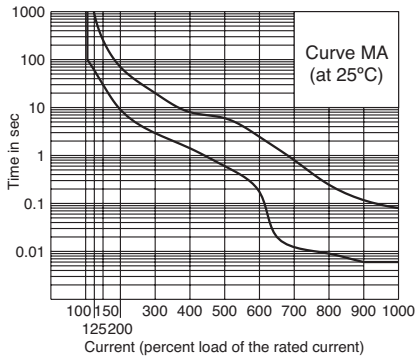
Note: Circuit protectors with inertia delay may have a slightly longer time delay at 600% or higher.

Time Delay Curves

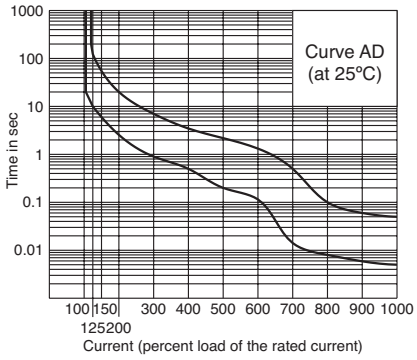
For AC

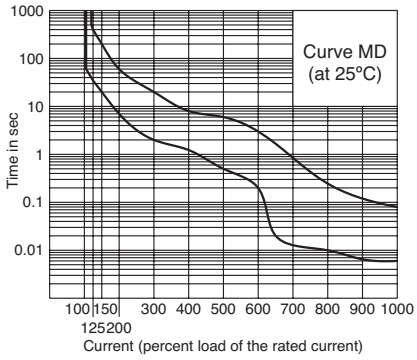






For DC



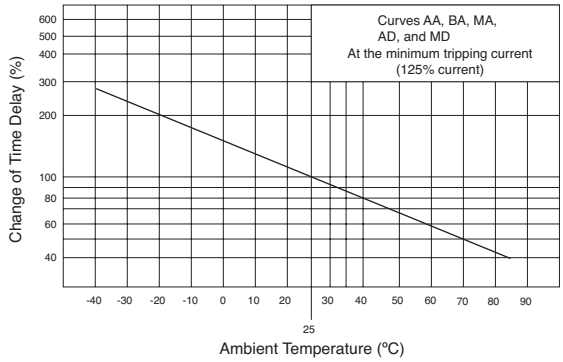


Time Delay Curve and Ambient Temperature

Since the NRA series circuit protectors employ an electromagnetic tripping system, the rated current (trip current) is not affected by the ambient temperatures, but the time delay varies with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in shorter delay, whereas at lower temperatures the delay will be prolonged.
The above time delay curves are at 25ºC. With reference to these curves, time delays can be corrected.

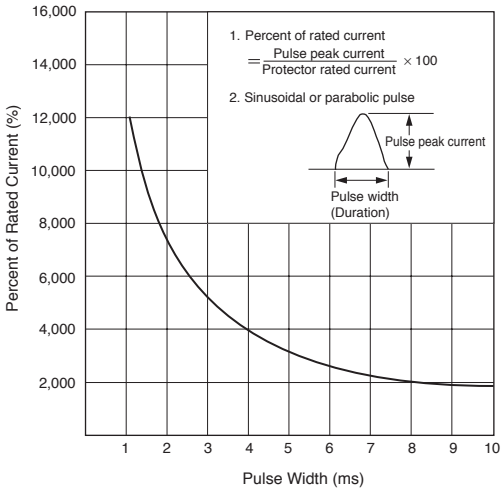
Temperature Correction Curve

The above time delay curves are at 25ºC. With reference to the following figure, time delays can be corrected.



Circuit Protector with Inertia Delay

Circuit protectors equipped with inertia delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on the subsequent overcurrents.



Note: Inertia delay is designed not to trip on a pulse of 20 times the rated current (peak value) for a duration of 8 ms. See the above curve.

All dimensions in mm.

Impedance and Coil Resistance

Series Trip (Current Trip) (at 25ºC)

Rated Current	Current Trip	
	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
	Curves AA, BA, and MA	Curves AD and MD
0.3A	9.82	9.67
0.5A	3.36	3.24
0.75A	1.49	1.45
1A	0.92	0.90
2A	0.21	0.21
3A	0.092	0.09
5A	0.036	0.036
7.5A	0.018	0.017
10A	0.012	0.0012
15A	0.0068	0.0066
20A	0.0048	0.0048
25A	0.0043	0.0043
30A	0.0041	0.0036

Note: Tolerance: ±25% (up to 5A), ±50% (7.5A or higher)

Relay Trip (Voltage Trip) (at 25ºC)

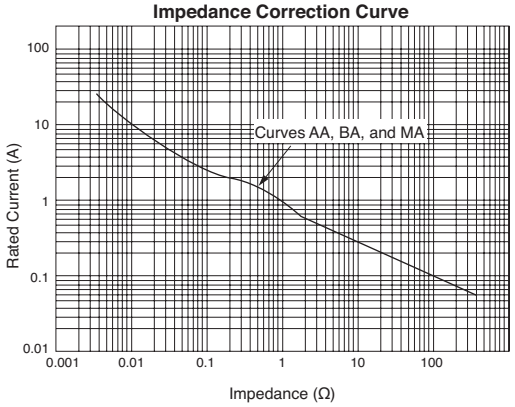
Rated Voltage	For DC Resistance (Ω)
24V DC	163

Note: Tolerance: ±25%

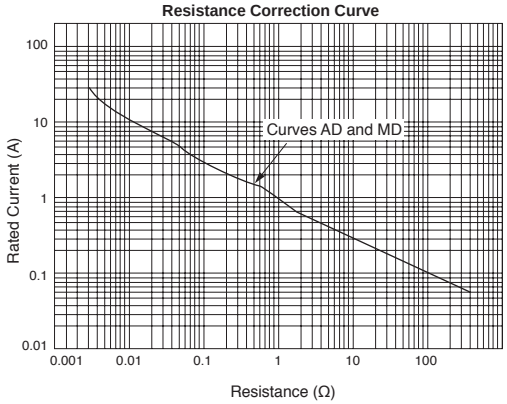
Voltage Drop due to Coil Resistance or Impedance

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 for a power-supply switch, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves in spite of the same rated current, which should also be considered during installation.

Impedance Correction Curve



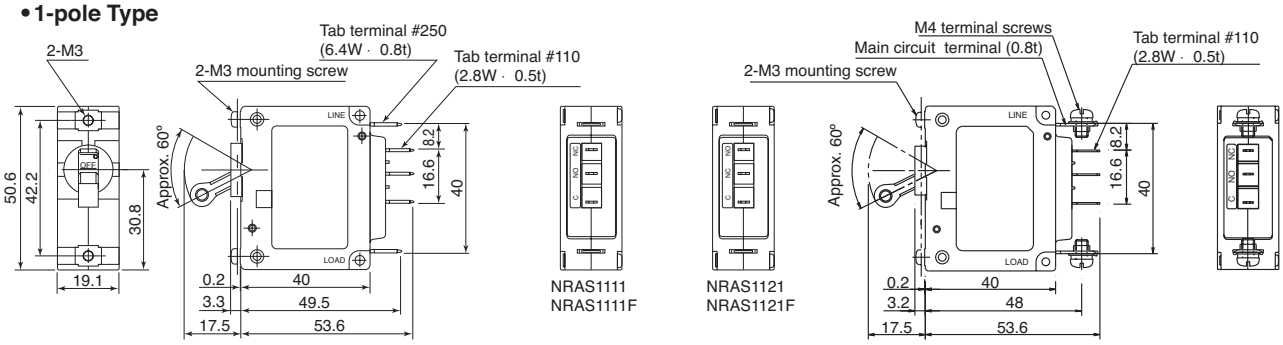
Resistance Correction Curve



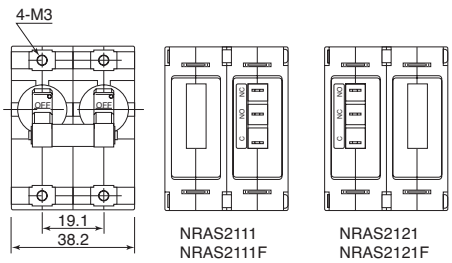
Dimensions

NRAS (Lever Type)

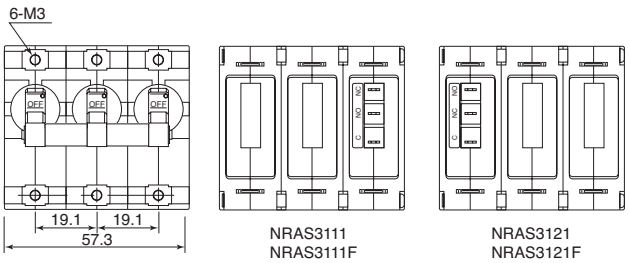
• 1-pole Type



• 2-pole Type

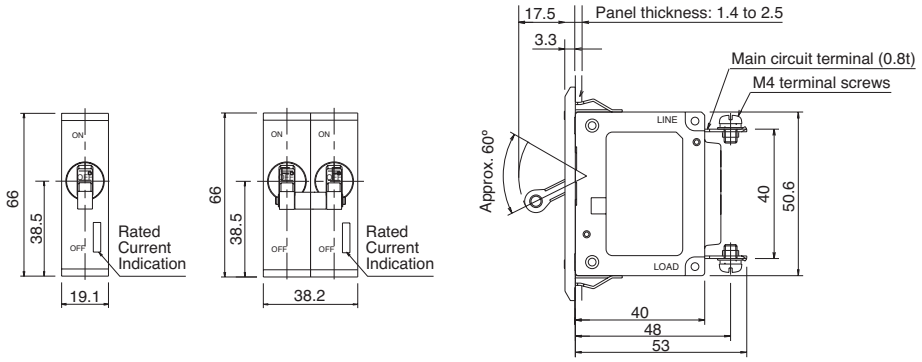


• 3-pole Type



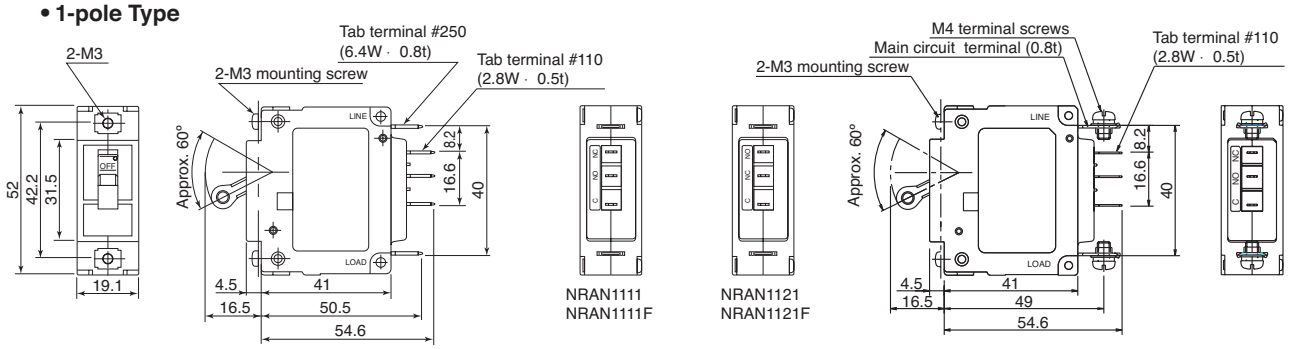
All dimensions in mm.

NRAS (Lever Type with Flush Plate)

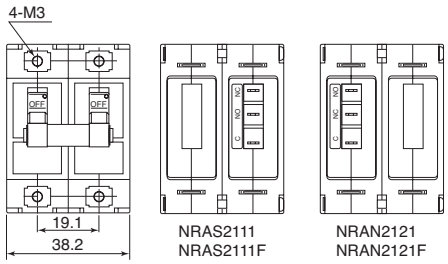


NRAN (Lever Type)

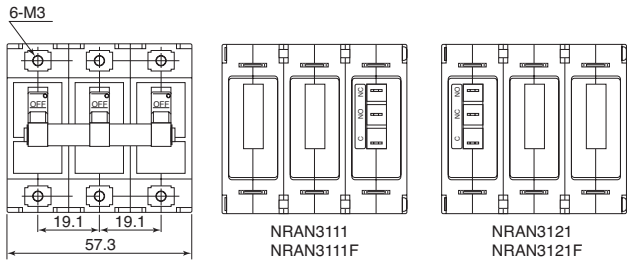
• 1-pole Type



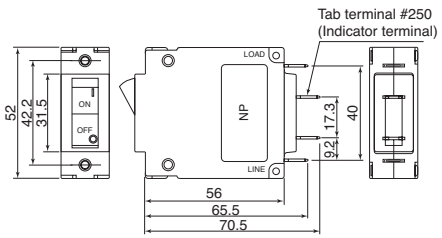
• 2-pole Type



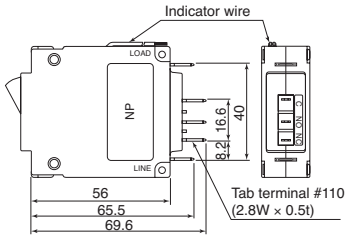
• 3-pole Type



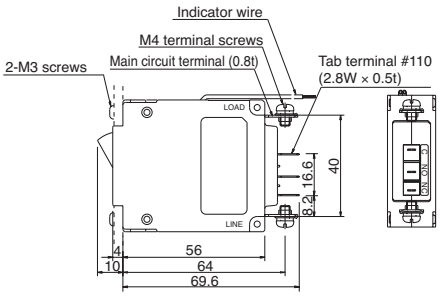
NRAR (Rocker Type)



NRAR1100 (with indicator)



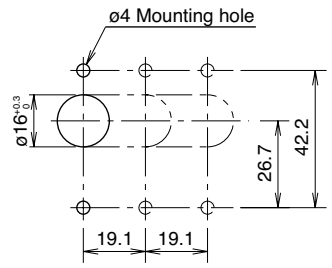
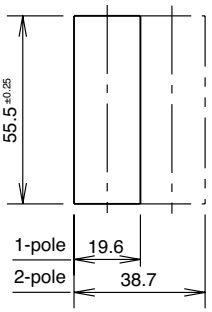
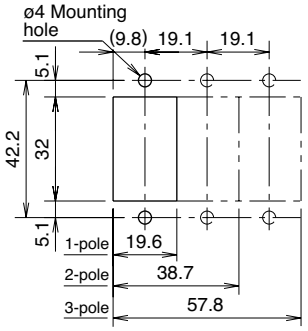
NRAR1111 (with auxiliary contact and indicator)



(Screw Terminal Type)

All dimensions in mm.

Mounting Hole Layout

Type	NRAS	NRAS with Flush Plate	NRAN and NRAR
Panel Cut-out			
	Note: See "Accessories" for the mounting hole when the plug-in base is used.	Note: Flush plate is installed on the circuit protector before shipment and cannot be removed.	Note: "Accessories" for the mounting holes when the flush plate or plug-in base is used.

M3 screw mounting
Tightening torque: 0.5 N•m
Tightening strength: 1.1 N•m

Panel Mounting Screw Length

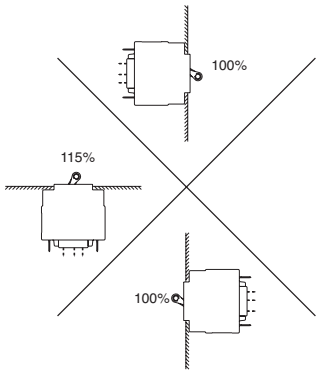
Select the screw length with reference to the following table.

Panel thickness (mm)	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	3.2
Without washer	(4)	(4)	5	5	5	5	5	6	6	6
With plain washer (0.5 mm thick)	5	5	5	5	6	6	6	6	6	(7)
With spring washer (0.7 mm thick)	5	5	5	5	6	6	6	6	6	7
With plain washer (0.5 mm thick) and spring washer (0.7 mm thick)	6	6	6	6	6	6	6	(7)	(7)	8

Note: Avoid using screws in the parenthesized lengths whenever possible.

Installation Angle

Overcurrent tripping method is hydraulic magnetic. Minimum operating current varies with installation angle because operating currents are influenced by the weight of movable iron core. With reference to the following figure, correct the minimum operating current.



Instructions

One-pole type circuit protectors cannot be combined to make 2- or 3-pole units due to their characteristics. Order multi-pole types from IDEC.

Recommended Soldering Conditions

Solder the main terminal at a temperature of 390°C within 10 seconds using a 60W soldering iron.
Solder the auxiliary/alarm terminal at a temperature of 350°C within 3 seconds using a 60W soldering iron. (Sn-Ag-Cu lead-free solder is recommended.)
When soldering, do not touch the circuit protector housing, auxiliary and alarm contacts with the soldering iron, and do not bend the terminals or pull the wires.
Check your actual soldering conditions before soldering.

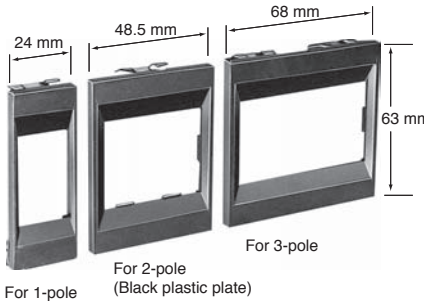
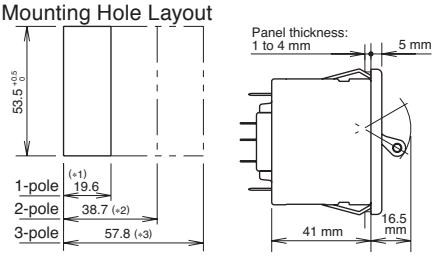
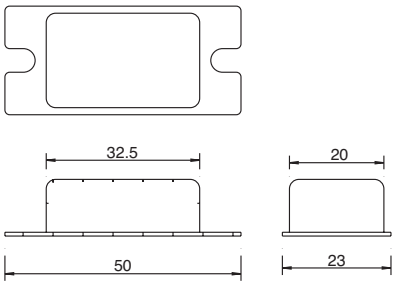
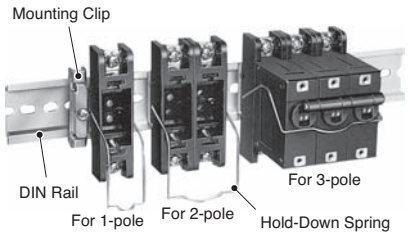
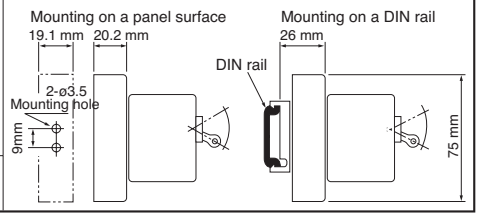
Main Circuit Terminal: Screw terminal

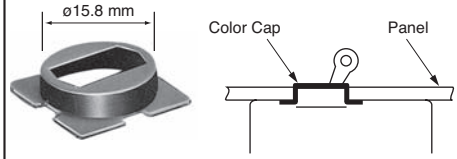
1. Applicable wire size	1.25 to 5.5 mm^2
2. Applicable crimping terminal	R1.25-4 to R5.5-4
3. No.of crimping terminal	1
4. Tightening torque	1.0 to 1.2 N•m
5. Tensile strength (Static 1 minute)	Axial direction: 80N Transverse direction: 20N

Thrust force (screw pressing load) in screw tightening should be 29N o less. The screw driver may slip out depending on the shape type and conditions. In this case, hold the terminal with a tool and tighten the screw by applying a thrust force of about 50N without deforming the terminal.

Accessories (Option)

Package Quantity: 1

Appearance	Specifications		Type No.	For Use on	Description / Dimensions
Flush Plate  	For 1-pole		NR31	NRAN NRAR	Mounting Hole Layout  Panel cut-out dimensions for collective mounting of two or more units are as follows: (N= No. of units) 1) 1-pole type --- 24.3N – 5 2) 2-pole type --- 48.8N – 10 3) 3-pole type --- 69.3N – 10
	For 2-pole		NR32	NRAN	
	For 3-pole		NR33		
Dustproof Cover  (Silicon rubber)	For 1-pole		NRA-C1	NRAR	
Plug-in Base (250V AC/DC • 20A max.)  	Surface Mount	For 1-pole	NUS1	NRAS NRAN	Surface mount types can mount directly on a panel surface with two M3 screws. DIN rail mount types can snap onto a DIN rail. Applicable only for series trip units. (Not applicable for units with auxiliary and alarm contact or with indicator.) Terminal screw M4, 20A max., with hold-down spring Tightening torque: 1.0 to 1.3 N•m 
		For 2-pole	NUS2		
		For 3-pole	NUS3		
		For 1-pole	NUS11	NRAR	
	DIN Rail Mount	For 1-pole	NR21	NRAS NRAN	
		For 2-pole	NR22		
		For 3-pole	NR23		
		For 1-pole	NR211	NRAR	

Appearance	Color	Type No.	Ordering Type No.	Package Quantity	For Use on	Description
Color Cap  	Blue	NR5S	NR5SPN05	5	NRAS	Color caps fit onto NRAS circuit protectors for color-coding circuits and improved appearance of the panel. Available in four colors: Blue (7.5B4/8 approx.) Red (7.5R5/14 approx.) White (N9.5 approx.) Yellow (2.5Y9/4 approx.)
	Red	NR5R	NR5RPN05			
	White	NR5H	NR5HPN05			
	Yellow	NR5Y	NR5YPN05			

Miniature circuit protectors with hydraulic-magnetic tripping system, allow for space and cost savings. Long life also reduces maintenance costs.

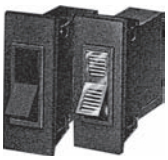
- Compact size (only 36.6H × 16.8W × 42D mm)
- One-lever (one-rocker) for 2-poles, ensures proper interruption to both poles when one pole is tripped.
- Low, middle, and high speed response
- Variety of rated currents and internal circuits
- Available with auxiliary contacts and inertia delay
- Over 20,000 mechanical operations
- Hydraulic-magnetic tripping system
- Safe trip-free mechanism
- Vibration-proof design

This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector."

Applicable Standards	Certification Mark	Certification Organization / File No.
UL1077		UL/c-UL File No. E68029
CSA C22.2 No. 235		No. LR83454
EN60934 (VDE0642)		No. 102746
GB17701		CCC No. 2005010307151789
Electrical Appliance and Material Safety Law Technical Standard	(For switch type)	(Electrical appliance excepting specified appliances)

For details, see the list of standard certified products in the back of this catalog.

Specifications

Type	NRLT	NRLP	NRLY	NRLR	NRLK
Appearance	 Lever Type (Lever color: Black)	 Lever Type (Lever color: Black)	 Rocker Type / Illuminated Rocker Type (Neon, LED)	 Rocker Type / Illuminated Rocker Type (Neon, LED)	 Large Rocker Type
Operator Style	Lever	Lever	Rocker (non-illuminated), Illuminated rocker		Large rocker (non-illuminated)
Protection Method	Hydraulic-magnetic tripping system				
Internal Circuit	Series trip (Current trip), Relay trip (Voltage trip)∗ Series trip (Current trip) with auxiliary contacts, Switch only, Switch only with auxiliary contact				∗: Not available on NRLP
No. of Poles	1-pole, 2-pole (1-lever)	1-pole	1-pole, 2-pole (1-rocker)		
Rated Voltage	250V AC 50/60Hz, 50V DC				
Minimum Applicable Load	24V AC/DC, 100 mA (reference value)				
Rated Current	Current trip: 0.1A, 0.5A, 1A, 2A, 3A, 4A, 5A, 7.5A, 10A, 12.5A, 15A, 20A				Switch only type: 20A max.
Trip Voltage (Voltage trip)	100V AC 50/60Hz,24V DC (operating at 90% of the rated voltage or higher, at 25°C) Voltage application duration: 1 sec maximum Trip time: 0.05 sec maximum (at the rated voltage)				
Rated Interrupting Capacity	250V AC 50/60Hz, 750A PC1 (UL rating: 1000A) 50V DC, 500A PC1 (UL rating: 1000A)				
Auxiliary Contact	SPDT microswitch 125V AC • 3A (resistive load), 30V DC • 2A (resistive load)				
Reference Temperature	+25°C				
Operating Temperature	−40 to +60°C (no freezing)				
Operating Humidity	45 to 85% RH (no condensation)				
Insulation Resistance	100 MΩ minimum (500V DC megger)				
Dielectric Strength	2000V AC, 1 minute (between live part and ground, between terminals of different poles, between terminals of the same pole when main contacts are open, between main circuit and auxiliary contact)				
Vibration Resistance	100 m/s^2 (10 to 55 Hz), with the rated current applied				
Shock Resistance	500 m/s^2 (operating extremes and damage limits), with the rated current applied (auxiliary contact: 360 m/s^2)				
Life	Electrical: Over 10,000 operations minimum (6 operations/min) Mechanical: Over 20,000 operations minimum (6 operations/min)				
Terminal Style (Note)	Main terminal: Tab terminal #250 [NRLP: PCB terminal] Auxiliary contact terminal: Solder terminal [NRLP: PCB terminal] Indicator terminal [Illuminated rocker type] : Tab terminal #110				
Mounting Style	Ring mounting	PC board mounting	Snap-on mounting	Screw mounting	Screw mounting
Weight (Approx.)	1-pole: 30g 2-pole: 60g (NRLT series trip)				

• The ratings of switch only type are 250V AC/50V DC and 20A, without protection function.
Note: Indicator terminal of 1-pole illuminated rocker type with auxiliary contact is a lead wire.

• Indicator Ratings (Illuminated Rocker Type)

Indicator	Voltage
Neon	100 to 125V AC
LED	6V, 12V, 24V, 48V AC/DC ±10%

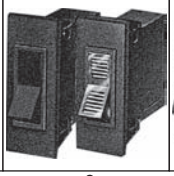
Note: Both neon and LED indicators have a built-in current limiting resistors.

• Standard Color

Housing		Black	
Lever (NRLT and NRLP)		Black	
Rocker and Indicator		Rocker Color	Indicator Color
(NRLY) (NRLR)	Non-illuminated	Black, red, green	–
	Neon	Transparent red	Red
	LED	Transparent red	Red
Large Rocker (NRLK)		Black, Red	

Type No. Development

1 Type

Lever Type **NRLT**	Lever Type **NRLP**	Rocker Type **NRLY**	Rocker Type **NRLR**	Large Rocker Type **NRLK**
				

8 Rocker Color (Non-illuminated rocker only)

NRLY, NRLR rocker type (non-illuminated) and NRLK large rocker type only

Black	(Code) B
Green	G
Red	R

8 Indicator Operating Voltage

NRLY and NRLR illuminated rocker type only

Light Source	Rated Voltage	(Code)
Neon	125V AC 50/60Hz	1
LED	6V AC/DC	3
	12V AC/DC	4
	24V AC/DC	5
	48V AC/DC	7

* On the illuminated type, the rocker color is transparent red, and indicator is red.

1	2	3	4	5	6	7	8
NRLT	1	1	11	F	3A	AD	

2 No. of Poles

1-pole	(Code) 1
2-pole	2

NRLP is available only in 1-pole type.

3 Internal Circuit

	Code
Series Trip (Current Trip)	1
Relay Trip* (Voltage Trip)	5
Switch Only Type	0

*NRLP is available only in series trip and switch only type.

4 Auxiliary Contacts

		(Code)
Without		00
w/auxiliary contacts	Solder Terminal	11
	PCB Terminal	14

On the 2-pole type, one auxiliary contact is provided on the left side as viewed from the front.

5 Inertia Delay

	(Code)
Without	Blank
With*	F

*Inertia delay is not available on curves EA and ED.

6 Rated Current and Voltage

• Current Trip	
0.1A	5A
0.5A	7.5A
1A	10A
2A	12.5A
3A	15A
4A	20A
Rated Voltage	
100V AC	
24V DC	

7 Time Delay Curves

AC		AA
		BA
	*	EA
DC		AD
		BD
	*	ED

*Inertia delay is not available on curves EA and ED.

*Switch only type does not require designation.

NRLT (Lever Type)

• Specify a rated current or voltage, and time delay curve in place of 6 7.

Package Quantity: 1

Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code	
					6 Rated Current or Voltage	7 Time Delay Curve
Series Trip Current Trip	1	Without	Without	NRLT1100- 6 7	0.1A, 0.5A, 1A, 2A, 3A, 4A, 5A, 7.5A, 10A, 12.5A, 15A, 20A	AA, AD, BA, BD, EA, ED
			With	NRLT1111- 6 7		
		With	Without	NRLT1100F- 6 7		AA, AD, BA, BD
			With	NRLT1111F- 6 7		
	2	Without	Without	NRLT2100- 6 7		AA, AD, BA, BD, EA, ED
			With	NRLT2111- 6 7		
		With	Without	NRLT2100F- 6 7		AA, AD, BA, BD
			With	NRLT2111F- 6 7		
Relay Trip Voltage Trip	1	Without	Without	NRLT1500- 6	100V AC 24V DC	—
	2		Without	NRLT2500- 6		
Switch Only Type	1	Without	Without	NRLT1000	—	—
			With	NRLT1011		
	2		Without	NRLT2000		
			With	NRLT2011		

NRLY (Rocker Type)

[Snap-on Mounting Type]

• Specify a rated current or voltage, time delay curve, and indicator or rocker color in place of 6 7 8. Package Quantity: 1

Illumination	Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code			
						6 Rated Current and Voltage	7 Time Delay Curve	8 Indicator	8 Rocker Color
Illuminated Type	Series Trip Current Trip	1	Without	Without	NRLY1100- 6 7 - 8	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED	1: Neon 125V AC 50/60Hz 3: LED 6V AC/DC 4: LED 12V AC/DC 5: LED 24V AC/DC 7: LED 48V AC/DC	—
				With	NRLY1111- 6 7 - 8				
			With	Without	NRLY1100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLY1111F- 6 7 - 8				
		2	Without	Without	NRLY2100- 6 7 - 8		AA, AD, BA, BD, EA, ED		
				With	NRLY2111- 6 7 - 8				
			With	Without	NRLY2100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLY2111F- 6 7 - 8				
	Relay Trip Voltage Trip	1	Without	Without	NRLY1500- 6 - 8	100V AC 24V DC	—		
		2		Without	NRLY2500- 6 - 8				
	Switch Only Type	1	Without	Without	NRLY1000- 8	—	—		
				With	NRLY1011- 8				
		2		Without	NRLY2000- 8				
				With	NRLY2011- 8				
Non-illuminated Type	Series Trip Current Trip	1	Without	Without	NRLY1100- 6 7 - 8	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED	—	B, G, R
				With	NRLY1111- 6 7 - 8				
			With	Without	NRLY1100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLY1111F- 6 7 - 8				
		2	Without	Without	NRLY2100- 6 7 - 8		AA, AD, BA, BD, EA, ED		
				With	NRLY2111- 6 7 - 8				
			With	Without	NRLY2100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLY2111F- 6 7 - 8				
	Relay Trip Voltage Trip	1	Without	Without	NRLY1500- 6 - 8	100V AC 24V DC	—		
		2		Without	NRLY2500- 6 - 8				
	Switch Only Type	1	Without	Without	NRLY1000- 8	—	—		
				With	NRLY1011- 8				
		2		Without	NRLY2000- 8				
				With	NRLY2011- 8				

NRLR (Rocker Type) [Screw Mounting Type]

• Specify a rated current or voltage, time delay curve, and indicator or rocker color in place of 6 7 8. Package Quantity: 1

Illumination	Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code			
						6 Rated Current and Voltage	7 Time Delay Curve	8 Indicator	8 Rocker Color
Illuminated Type	Series Trip Current Trip	1	Without	Without	NRLR1100- 6 7 - 8	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED	1: Neon 125V AC 50/60Hz 3: LED 6V AC/DC 4: LED 12V AC/DC 5: LED 24V AC/DC 7: LED 48V AC/DC	—
				With	NRLR1111- 6 7 - 8				
			With	Without	NRLR1100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLR1111F- 6 7 - 8				
		2	Without	Without	NRLR2100- 6 7 - 8		AA, AD, BA, BD, EA, ED		
				With	NRLR2111- 6 7 - 8				
			With	Without	NRLR2100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLR2111F- 6 7 - 8				
	Relay Trip Voltage Trip	1	Without	Without	NRLR1500- 6 - 8	100V AC 24V DC	—		
		2		Without	NRLR2500- 6 - 8				
	Switch Only Type	1	Without	Without	NRLR1000- 8	—	—		
				With	NRLR1011- 8				
		2		Without	NRLR2000- 8				
				With	NRLR2011- 8				
Non-illuminated Type	Series Trip Current Trip	1	Without	Without	NRLR1100- 6 7 - 8	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED	—	B, G, R
				With	NRLR1111- 6 7 - 8				
			With	Without	NRLR1100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLR1111F- 6 7 - 8				
		2	Without	Without	NRLR2100- 6 7 - 8		AA, AD, BA, BD, EA, ED		
				With	NRLR2111- 6 7 - 8				
			With	Without	NRLR2100F- 6 7 - 8		AA, AD, BA, BD		
				With	NRLR2111F- 6 7 - 8				
	Relay Trip Voltage Trip	1	Without	Without	NRLR1500- 6 - 8	100V AC 24V DC	—		
		2		Without	NRLR2500- 6 - 8				
	Switch Only Type	1	Without	Without	NRLR1000- 8	—	—		
				With	NRLR1011- 8				
		2		Without	NRLR2000- 8				
				With	NRLR2011- 8				

NRLK (Large Rocker Type)

[Snap-on Mounting Type]

• Specify a rated current or voltage, time delay curve, and rocker color in place of 6 7 8.

Package Quantity: 1

Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code		
					6 Rated Current and Voltage	7 Time Delay Curve	8 Rocker Color
Series Trip Current Trip	1	Without	Without	NRLK1100- 6 7 - 8	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED	B, G, R
			With	NRLK1111- 6 7 - 8			
		With	Without	NRLK1100F- 6 7 - 8		AA, AD, BA, BD	
			With	NRLK1111F- 6 7 - 8			
	2	Without	Without	NRLK2100- 6 7 - 8		AA, AD, BA, BD, EA, ED	
			With	NRLK2111- 6 7 - 8			
		With	Without	NRLK2100F- 6 7 - 8		AA, AD, BA, BD	
			With	NRLK2111F- 6 7 - 8			
Relay Trip Voltage Trip	1	Without	Without	NRLK1500- 6 - 8	100V AC 24V DC	—	
	2		Without	NRLK2500- 6 - 8		—	
Switch Only Type	1	Without	Without	NRLK1000- 8	—	—	
			With	NRLK1011- 8			
	2		Without	NRLK2000- 8			
			With	NRLK2011- 8			

NRLP (Lever Type)

[PC Board Mounting Type]

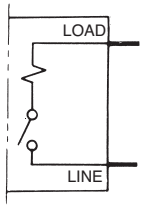
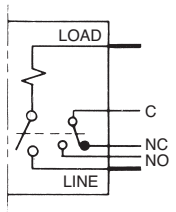
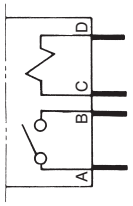
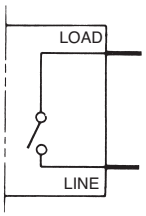
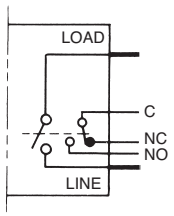
• Specify a rated current and time delay curve in place of 6 7.

Package Quantity: 1

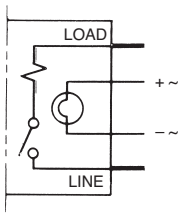
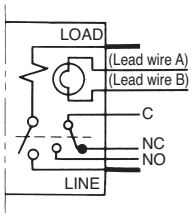
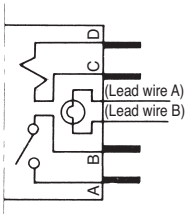
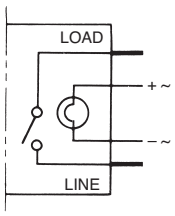
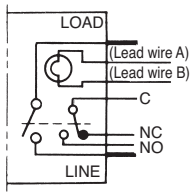
Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code	
					6 Rated Current	7 Time Delay Curve
Series Trip Current Trip	1	Without	Without	NRLP1100- 6 7	0.1A 0.5A 1A 2A 3A 4A 5A 7.5A 10A 12.5A 15A 20A	AA, AD, BA, BD, EA, ED
			With	NRLP1114- 6 7		
		With	Without	NRLP1100F- 6 7		AA, AD, BA, BD
			With	NRLP1114F- 6 7		
Switch Only Type	1	Without	Without	NRLP1000	—	—
			With	NRLP1014		

Internal Circuits

NRLT, NRLP, NRLY (Non-illuminated), NRLR (Non-illuminated), and NRLK

Series Trip (Current Trip)	Series Trip (Current Trip)	Relay Trip (Voltage Trip)	Switch Only Type	Switch Only Type With Auxiliary Contact
				

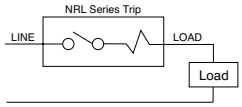
NRLY (Illuminated Type), NRLR (Illuminated Type)

Series Trip (Current Trip)	Series Trip (Current Trip)	Relay Trip (Voltage Trip)	Switch Only Type	Switch Only Type With Auxiliary Contact
				 On the 2-pole type, indicator terminal are a tab terminals.

Note 1: On the 2-pole type, one auxiliary contact is provided on the left side as viewed from the front.
See the dimensional drawing for the terminal arrangement.

Note 2: NRLP is available with series trip and switch type.

- Wiring Example



- Lead wires are color-coded as follows (illuminated type):

Lead wire	Color	Neon Indicator	LED Indicator
(Lead wire A)	Red	AC	Positive
(Lead wire B)	Black	AC	Negative

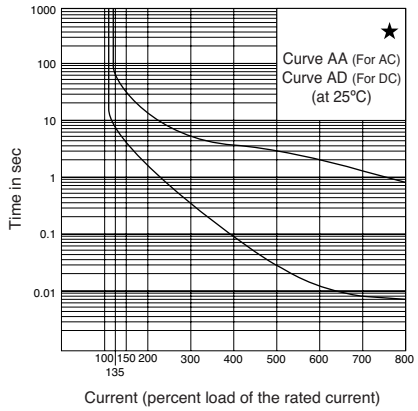
Overcurrent - Time Delay Characteristics (sec at 25ºC)

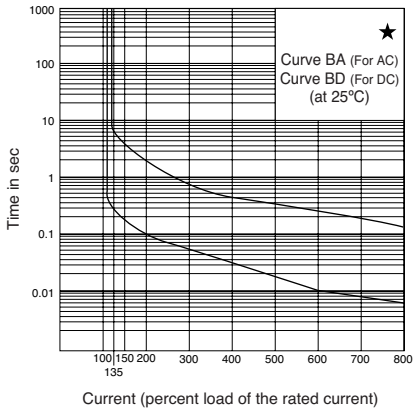
Time Delay Curves		Percent of Rated Current						
AC 50/60Hz	DC	100%	135%	150%	200%	400%	600%	800%
AA ★	AD ★	No Trip	3-70	2-40	1-15	0.1-4	0.01-2	0.007-0.8
BA ★	BD ★	No Trip	0.3-7	0.2-5	0.1-2	0.03-0.5	0.01-0.3	0.007-0.15
EA	ED	No Trip	0.015-0.5	0.01-0.25	0.009-0.1	0.006-0.03	0.005-0.02	0.004-0.02

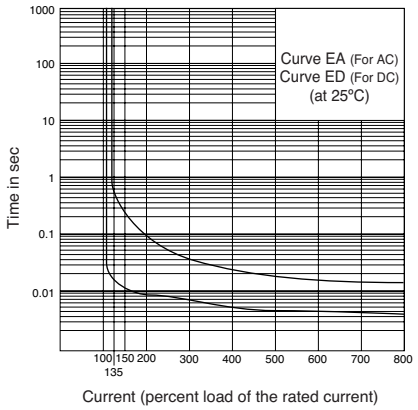
Note: Curves marked with ★ are also available with inertia delay. (Inertia delay is not available for Curves ED and EA)

Time Delay Curves

Note: Curves marked with ★ are also available with inertia delay.

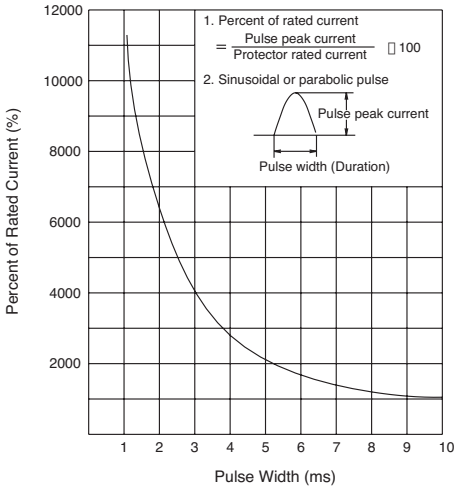






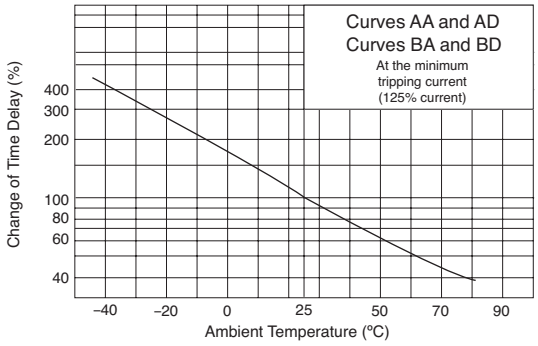
Circuit Protector with Inertia Delay

Inertia delay is designed not to trip on a non-repeating single pulse of 12 times the rated current (peak value) for duration of 8 ms. In addition, circuit protectors equipped with inertia delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on the subsequent overcurrents. Curves EA and ED are not available with inertia delay.



Temperature Correction Curve

The time delay curves on the preceding page are at 25ºC. With reference to the following curves, time delays can be corrected according to the ambient temperature.



Operation of Auxiliary Contacts

At tripping or manual ON-OFF operation, there is a lag in time between the operation of the main contact and the auxiliary contact.

Impedance and Coil Resistance (at 25ºC)

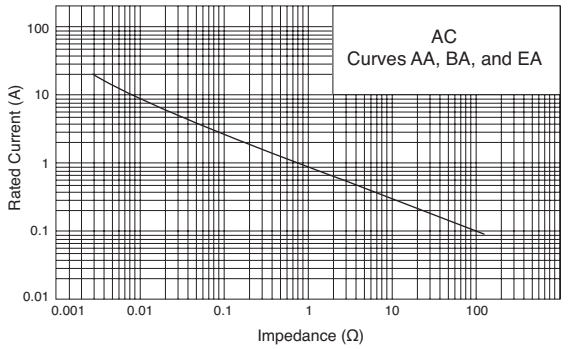
Rated Current	For AC 50/60Hz Impedance (Ω)	For DC, Impedance between Terminals (Ω)
	Curves AA, BA, and EA	Curves AD, BD, and ED
0.1A	97.0	96.0
0.5A	3.2	3.1
1A	0.81	0.78
2A	0.19	0.18
3A	0.086	0.085
4A	0.051	0.050
5A	0.034	0.034
7.5A	0.017	0.016
10A	0.0092	0.0087
12.5A	0.0068	0.0065
15A	0.0052	0.0050
20A	0.0033	0.0031

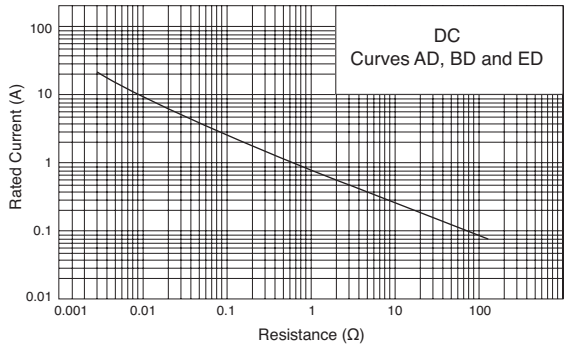
Note: Tolerance: ±25% (up to 5A), ±50% (7.5A or higher)

[Voltage trip type]

	For AC 50/60Hz Impedance (Ω)	For DC, Impedance between Terminals (Ω)
100V AC	3000	—
24V DC	—	370

Note: Tolerance: ±25%

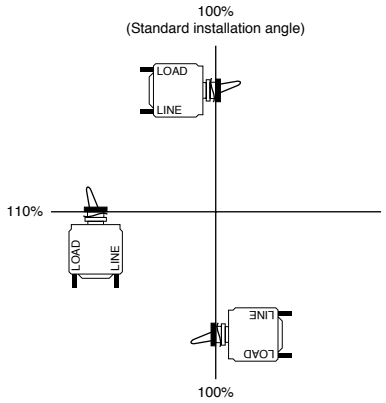




Rated Current (Trip Current) by Installation Angle

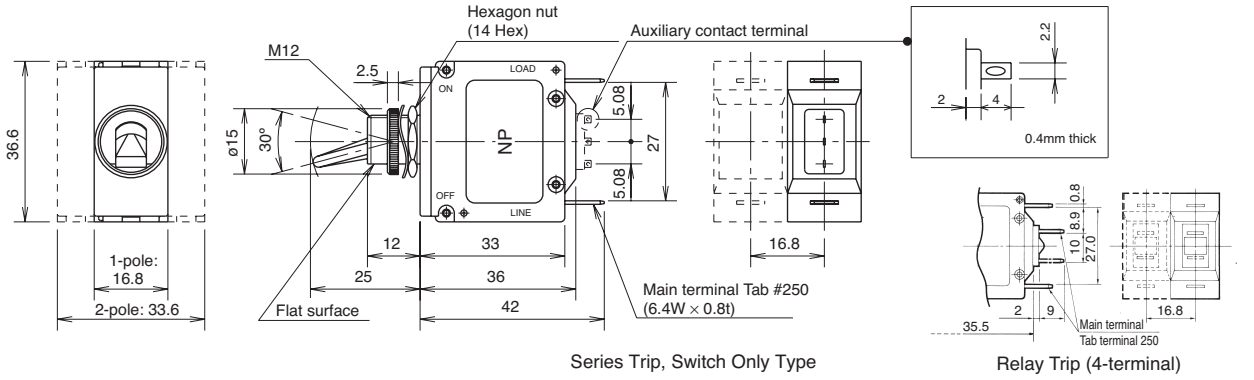
Overcurrent tripping method is hydraulic magnetic. Minimum operating currents vary with installation angle because operating currents are influenced by the weight of the iron core. With reference to the following figure, correct the rated current.

Note 1: The rated current does not change depending on the installation angle.
Note 2: The minimum operating current is calculated from the following formula:
(Minimum operating current) = (Rated current) × 135% × (Correction factor by installation angle)



Dimensions

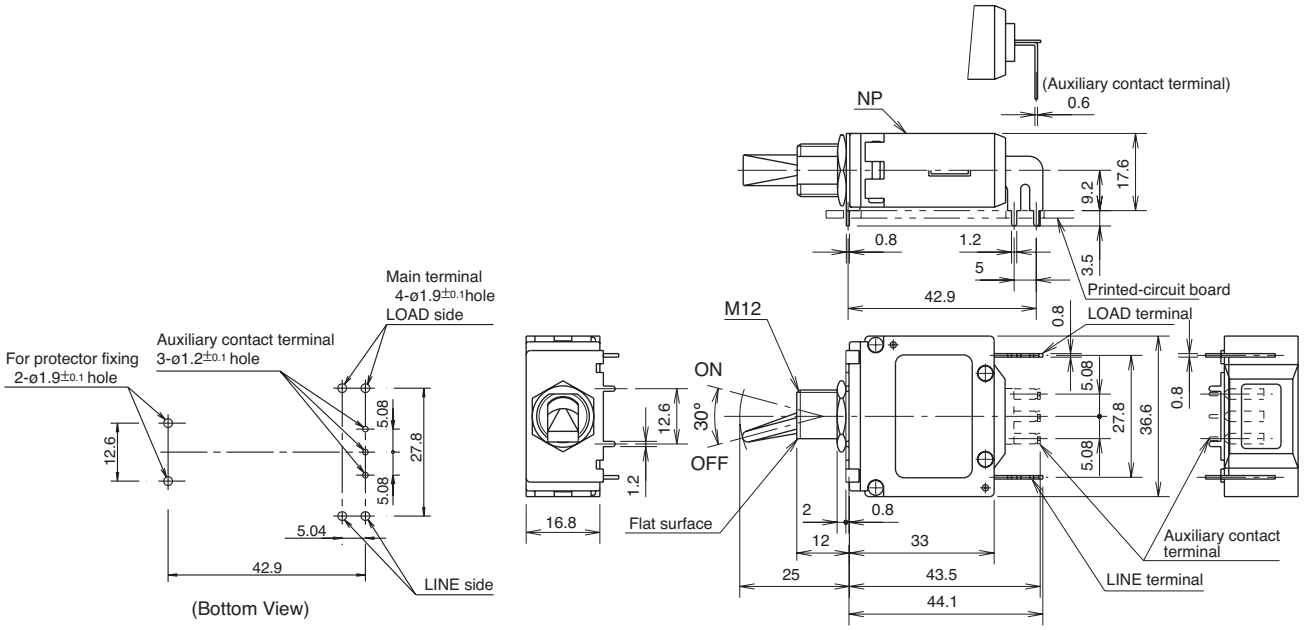
• **NRLT (Lever Type)** Note: The dashed lines show the 2-pole type.



Series Trip, Switch Only Type

Relay Trip (4-terminal)

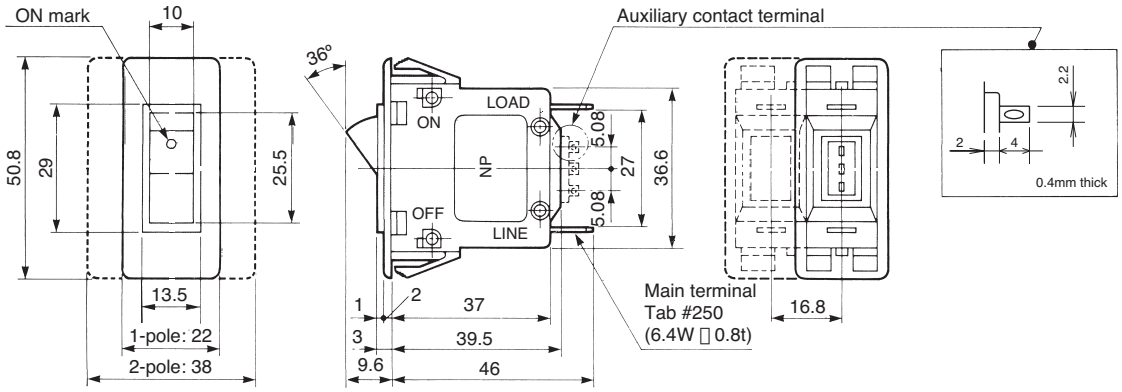
• **NRLP (Lever Type with PCB terminals)**



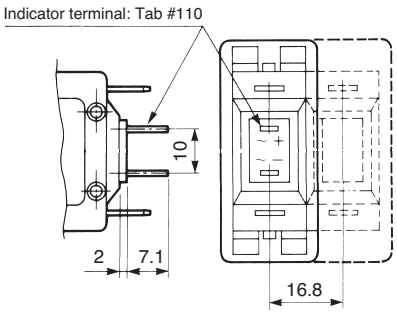
All dimensions in mm.

• NRLY (Snap-on Mounting, Rocker Type) Note: The dashed lines show the 2-pole type.

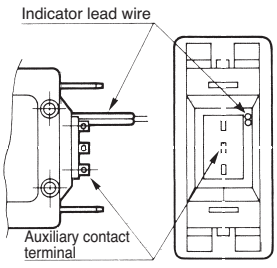
Rocker Type (Non-illuminated)
Series Trip, Switch Only Type



Illuminated Rocker Type (without auxiliary contact)
Series Trip, Switch Only Type

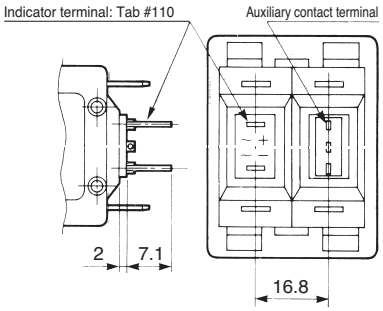


Illuminated Rocker Type (1-pole, with auxiliary contact)
Series Trip, Switch Only Type

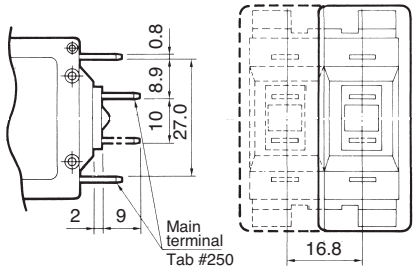


Lead wire length: Approx. 100 mm

Illuminated Rocker Type (2-pole, with auxiliary contact)
Series Trip, Switch Only Type

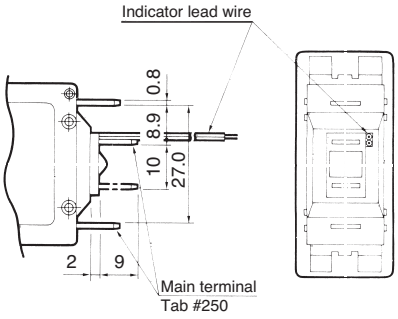


Rocker Type (Non-illuminated)
Relay Trip (4-terminal)



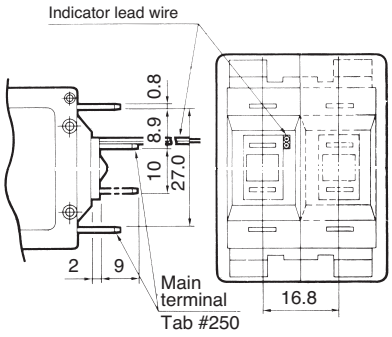
Lead wire length: Approx. 100 mm

Illuminated Rocker Type (1-pole)
Relay Trip (4-terminal)



Lead wire length: Approx. 100 mm

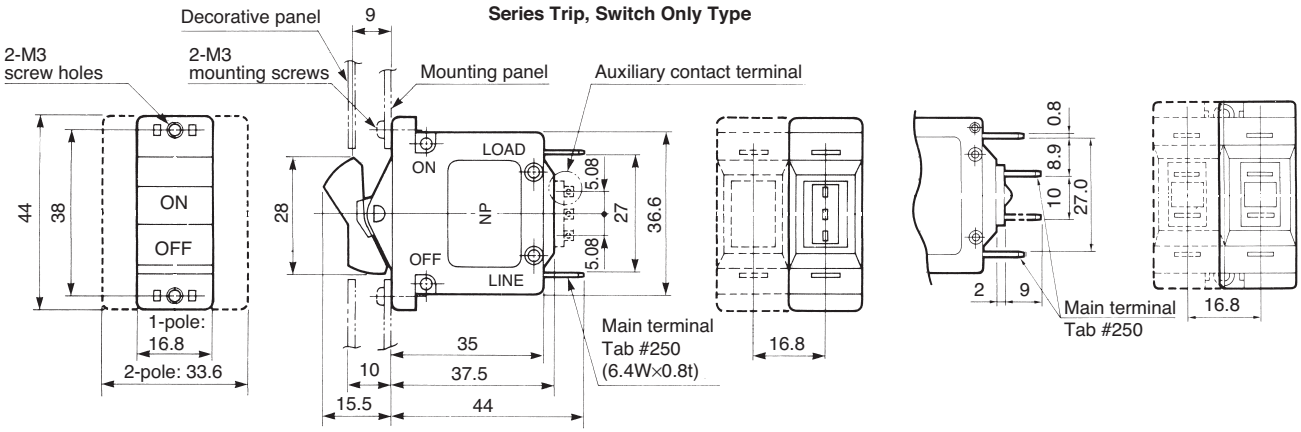
Illuminated Rocker Type (2-pole)
Relay Trip (4-terminal)



Lead wire length: Approx. 100 mm

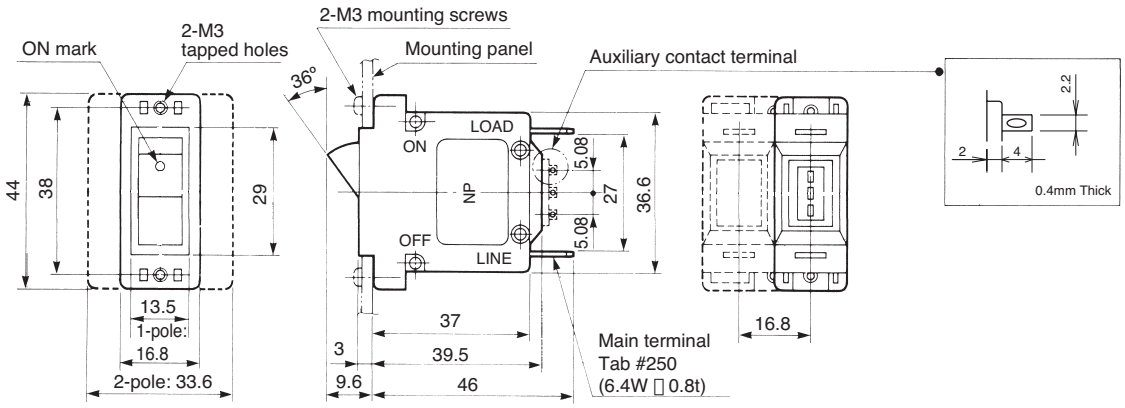
• NRLK (Large Rocker Type) Note: The dashed lines show the 2-pole type.

Series Trip, Switch Only Type

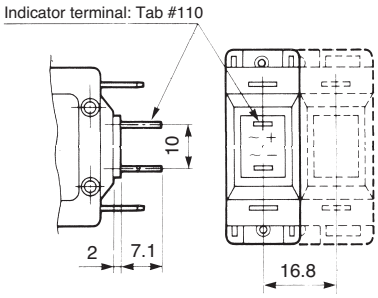


• **NRLR (Screw Mounting, Rocker Type)** Note: The dashed lines show the 2-pole type.

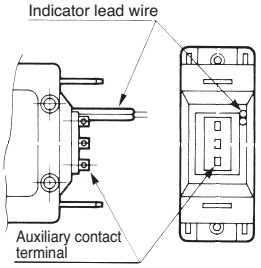
Rocker Type (Non-illuminated)
Series Trip, Switch Only Type



Illuminated Rocker Type (without auxiliary contact)
Series Trip, Switch Only Type

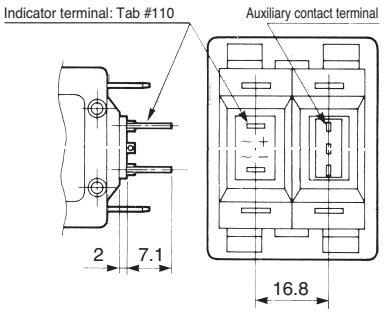


Illuminated Rocker Type (1-pole, with auxiliary contact)
Series Trip, Switch Only Type

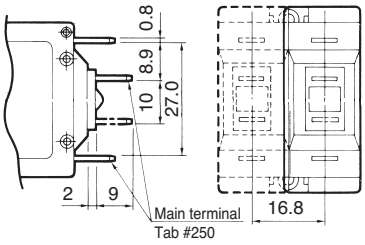


Lead wire length: Approx. 100 mm

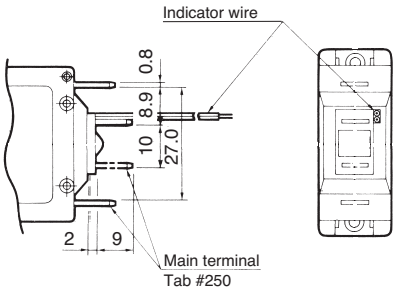
Illuminated Rocker Type (2-pole, with auxiliary contact)
Series Trip, Switch Only Type



Rocker Type (Non-illuminated)
Relay Trip (4-terminal)

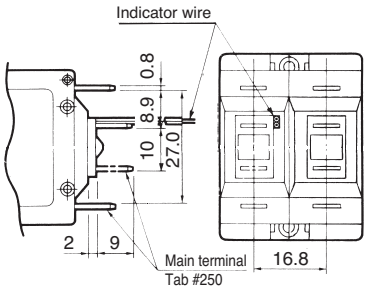


Illuminated Rocker Type (1-pole)
Relay Trip (4-terminal)



Lead wire length: Approx. 100 mm

Illuminated Rocker Type (2-pole)
Relay Trip (4-terminal)



Lead wire length: Approx. 100 mm

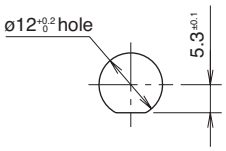
Mounting Hole Layout

Type: NRLT (Lever Type) / NRLY (Snap-on Mounting, Rocker Type)

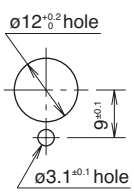
Panel Cut-out

When anti-rotation ring is used.
(Type No.: NRL-L)

1-pole/2-pole

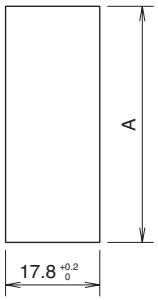


1-pole/2-pole

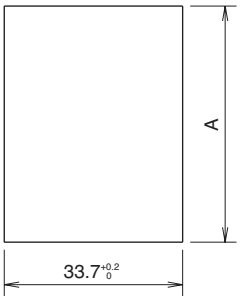


Tightening torque: 1.2 to 1.4 N•m

1-pole Type



2-pole Type



Panel Thickness

Maximum mounting panel thickness (NRLT):

Mounting Nut	Name Plate	Anti-rotation Ring	Maximum Panel Thickness NRLT
When a standard bezel is used (Thickness: 2.5 mm)	–	–	5.5 mm
	X	–	4.7 mm
	–	X	4.7 mm
	X	X	3.9 mm
When a decorative bezel is used (Thickness: 4 mm)	–	–	4.0 mm
	X	–	3.2 mm
	–	X	3.2 mm
	X	X	2.4 mm

Note 1: Standard mounting nut is supplied with the protector.
Note 2: Decorative bezel, name plate, and anti-rotation ring are sold separately.
(See "Accessories" for details.)

Panel thickness and Dimension A

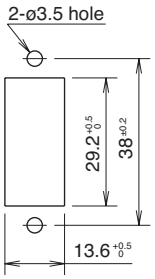
Panel Thickness	0.8 to 1.2 mm	1.6 mm	2.3 mm	3.2 mm
Dimension A	44.6 mm	45.1 mm	45.9 mm	46.9 mm
	Tolerance ±0.1 mm			

Note 1: Allowable range of mounting panel thickness: 0.8 to 3.2 mm
Note 2: Within the allowable range of mounting panel, Dimension A for panel thicknesses other than those listed in the above table can be calculated from the following formula:
Dimension A = 45.1 + 1.1 × (Panel thickness − 1.6)

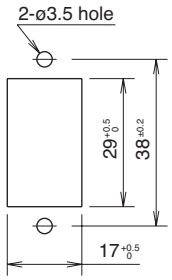
Type: NRLR (Screw Mounting, Rocker Type) / NRLK (Large Rocker Type)

Panel Cut-out

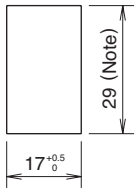
1-pole/2-pole



1-pole/2-pole



Panel cut-out of decorative panel
Note: These dimensions are reference values. When considering the design, check the actual unit.



Panel Thickness

3 mm maximum

See the dimensional drawing and select proper thickness, considering the height of mounting screw head.

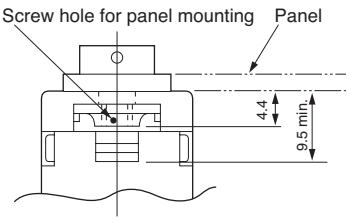
Applicable Mounting Screw Length

• Applicable length of panel mounting screw (M3)
Select proper length according to the table.

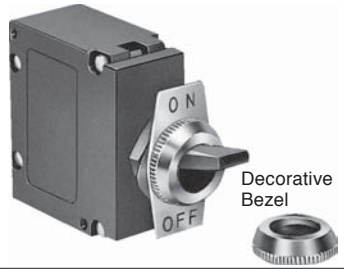
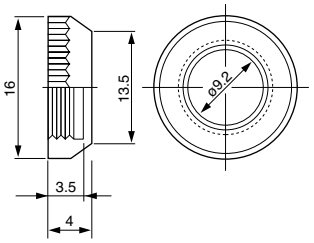
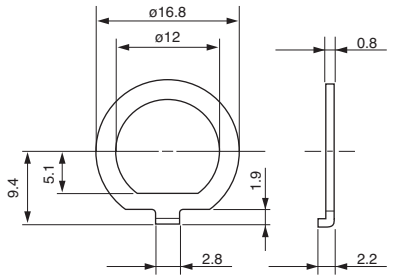
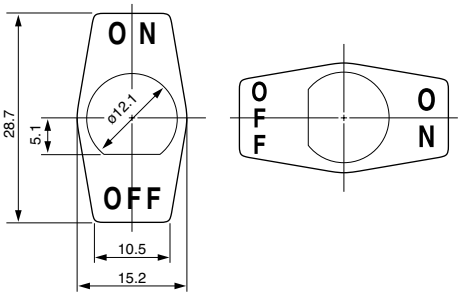
Panel thickness (mm)	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	3.2
Without washer	6 to 10 mm				7 to 11 mm				8 to 12 mm	
With plain washer (0.5 mm thick)	6 to 10 mm		7 to 11 mm				8 to 12 mm			9 to 13 mm
With spring washer (0.7 mm thick)	7 to 11 mm					8 to 12 mm				9 to 13 mm
With plain washer (0.5 mm thick), and spring washer (0.7 mm thick)	7 to 11 mm				8 to 12 mm			9 to 13 mm		

(M3 screw tightening torque: 0.5 to 0.8 N•m)

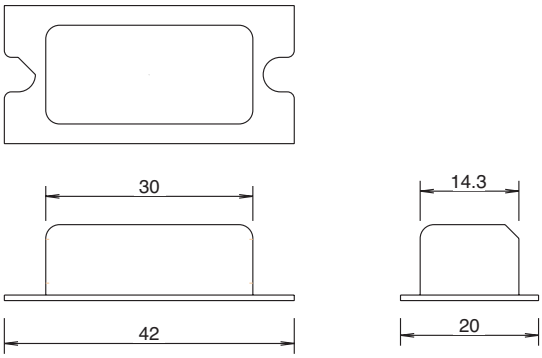
Screw Mounting Part Dimensions



Accessories for NRLT (Lever Type) • Optional

Name and Appearance		Type No.	Ordering Type No.	Package Quantity	Description and Dimensions
• **Decorative Bezel** 		NRL-R	NRL-RPN05	5	• The decorative bezel can be used in place of the standard bezel. Note that the maximum panel thickness differs from that with the standard bezel. • Material: Chrome-plated metal  (See "Mounting Hole Layout".)
• **Anti-rotation Ring** 		NRL-L	NRL-LPN05	5	• The anti-rotation ring is intended to ensure firm rotation prevention.(See "Mounting Hole Layout".) • Metal ring 
• **Nameplate** 	(Legend) ON I OFF	NRL-N1	NRL-N1PN05	5	• Aluminum plate (Aluminum colored) with black legend 
	I I O	NRL-N3	NRL-N3PN05		
	O F F – O N	NRL-N2	NRL-N2PN05	5	
	O – I	NRL-N4	NRL-N4PN05		

Package Quantity: 1

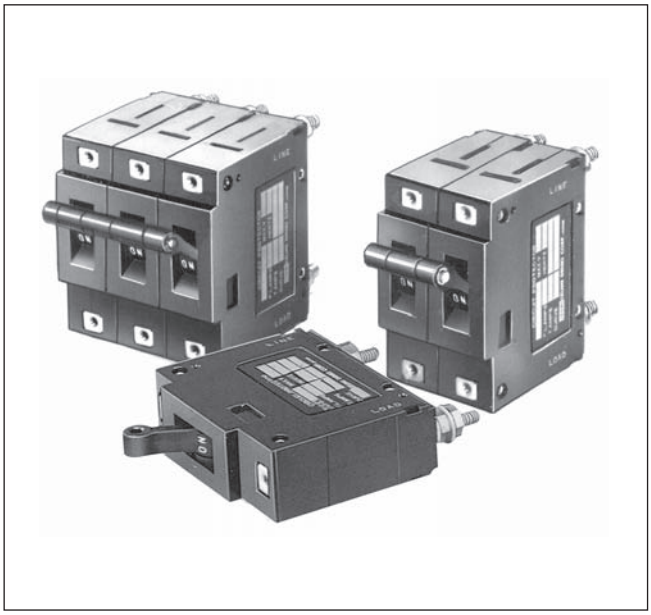
Name and Appearance		Type No.	Dimensions
• **Dustproof Cover**  (Silicon Rubber)	For 1-pole	NRL-C	• **For NRLR** 

Variety of rated currents: 1A to 50A
Widely employed for protection of PC power circuits and large current circuits of welding machines.

NRBM is the largest in the rated current among the IDEC circuit protector series.

- Electromagnetic trip, not affected by ambient temperature
- Safe trip-free mechanism
- Available with auxiliary contact and alarm contact
- Available with inertia delay
- Vibration-proof design

This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector."



Applicable standards	Certification Mark	Certification Organization / File No.
UL1077 CSA C22.2 No. 235	c UL us	UL/c-UL File No. E68029
EN60934 (VDE0642)	VDE	No. 113434
GB17701	CCC	CCC No. 2005010307151788
Electrical Appliance and Material Safety Law Technical Standard	PSE	JET

For details, see the list of standard certified products in the back of this catalog.

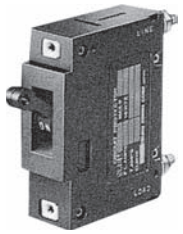
Specifications

Type	NRBM
Operator	Lever type
Protection Method	Hydraulic-magnetic tripping system
Internal Circuit	Series trip (current trip) Series trip with auxiliary contacts Series trip with alarm contacts
No. of poles	1, 2, 3 poles
Rated Voltage	250V AC 50/60 Hz, 65V DC
Minimum Applied Load	24V AC/DC, 100 mA (reference value)
Rated Current	Current trip: 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A
Rated Interrupting Capacity	250V AC 50/60Hz, 65V DC, 1000A
Auxiliary Contact Alarm Contact	SPDT microswitch 250V AC 5A 50V DC 1A (resistive load)
Reference Temperature	+25ºC
Operating Temperature	−40 to +85ºC (no freezing)
Operating Humidity	45 to 85% RH (no condensing)
Insulation Resistance	100 MΩ minimum (500V DC megger)
Dielectric Strength	2000V AC for 1 minute (between live part and ground, between terminals of different poles, between terminals of the same poles when main contacts are open, between main circuit and auxiliary contact)
Vibration Resistance	100 m/s^2 (10 to 55 Hz)
Shock Resistance	1000 m/s^2
Life	10,000 operations minimum (6 operations per minute)
Terminal Style	Main terminal: M5 stud screw Auxiliary contact and alarm contact: Tab terminal #80
Weight (Approx.)	1-pole: 100g, 2-pole: 200g, 3-pole: 300g

Type No. Development

1 Type

NRBM



4 Auxiliary Contact / Alarm Contact

	(Code)
Without	00
With auxiliary contact	11
With alarm contact	21

Note:
On the multi-pole types, one auxiliary contact is provided on the left side or one alarm contact is provided on the right side as viewed from the front.

5 Inertia Delay

	(Code)
Without	Blank
With	F

1	2	3	4	5	6	7
NRBM	1	1	11	F	50A	AA

2 No. of Poles

	(Code)
1-pole	1
2-pole	2
3-pole	3

Note:
NRBM is also available in standard 2, 3, or 4-pole types with identical internal circuits, ratings and curves in each pole. Simultaneous-throw and simultaneous-break (all levers interconnected) is standard.

3 Internal Circuit

	(Code)
Series Trip (Current Trip)	1

6 Rated Current

• Rated Current	
1A	15A
2A	20A
3A	25A
5A	30A
7.5A	40A
10A	50A

7 Time Delay Curve

	Time Delay Curve
AC type [50/60Hz]	AA
	BA
	MA
DC type	AD
	MD

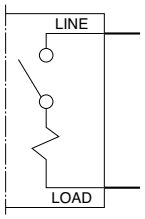
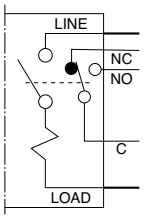
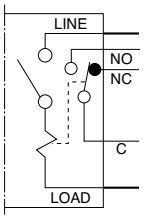
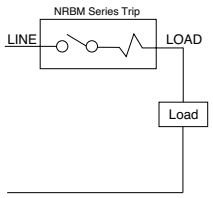
NRBM (Lever Type)

Specify a rated current and time delay curve in place of 6 7 .

Package Quantity: 1

Internal Circuit	No. of Poles	Inertia Delay	Auxiliary Contact Alarm Contact	Type No. (Ordering Type No.)	Code for Ordering	
					6 Rated Current	7 Time Delay Curve
Series Trip Current Trip	1	Without	Without	NRBM1100- 6 7	1A 2A 3A 5A 7.5A 10A 15A 20A 25A 30A 40A 50A	AA BA MA AD MD
			w/Auxiliary Contact	NRBM1111- 6 7		
			w/Alarm Contact	NRBM1121- 6 7		
		With	Without	NRBM1100F- 6 7		
			w/Auxiliary Contact	NRBM1111F- 6 7		
			w/Alarm Contact	NRBM1121F- 6 7		
	2	Without	Without	NRBM2100- 6 7		
			w/Auxiliary Contact	NRBM2111- 6 7		
			w/Alarm Contact	NRBM2121- 6 7		
		With	Without	NRBM2100F- 6 7		
			w/Auxiliary Contact	NRBM2111F- 6 7		
			w/Alarm Contact	NRBM2121F- 6 7		
	3	Without	Without	NRBM3100- 6 7		
			w/Auxiliary Contact	NRBM3111- 6 7		
			w/Alarm Contact	NRBM3121- 6 7		
		With	Without	NRBM3100F- 6 7		
			w/Auxiliary Contact	NRBM3111F- 6 7		
			w/Alarm Contact	NRBM3121F- 6 7		

Internal Circuits

Appearance	Series Trip (Current Trip)	Series Trip (Current Trip) With Auxiliary Contact	Series Trip (Current Trip) With Alarm Contact	Wiring Example
				

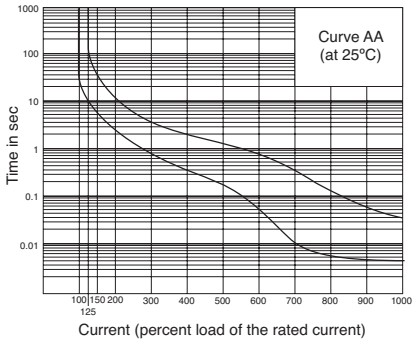
Overcurrent - Time Delay Characteristics (sec at 25ºC)

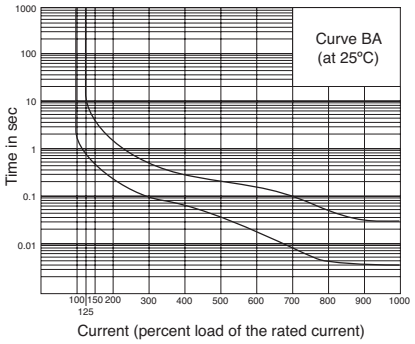
Type	Time Delay Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
AC 50/60Hz	AA	No Trip	15-120	8-45	3-15	0.48-2.5	0.06-0.8	0.007-0.13	0.005-0.04
	BA	No Trip	0.75-10	0.45-3.5	0.22-1.3	0.045-0.22	0.012-0.12	0.005-0.06	0.004-0.03
	MA	No Trip	70-900	30-260	10-70	1.8-11	0.5-4	0.009-1.1	0.006-0.2
DC	AD	No Trip	10-130	6-55	2.6-20	0.5-3.5	0.14-1.4	0.008-0.7	0.005-0.35
	MD	No Trip	35-400	20-180	8-60	1.6-10	0.6-4.5	0.01-2	0.007-0.5

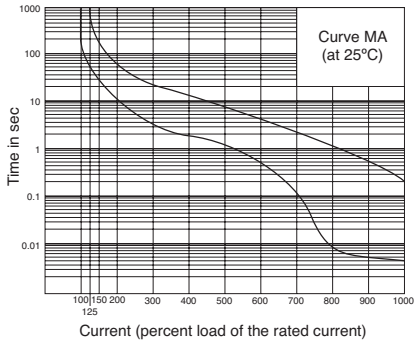
Note: Circuit protectors with inertia delay may have a slightly longer time delay at 600% or higher.

Time Delay Curves

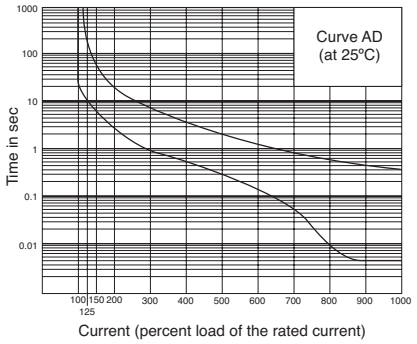
For AC

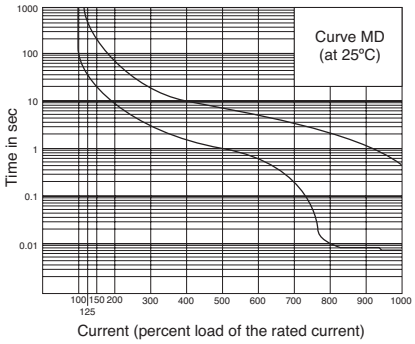




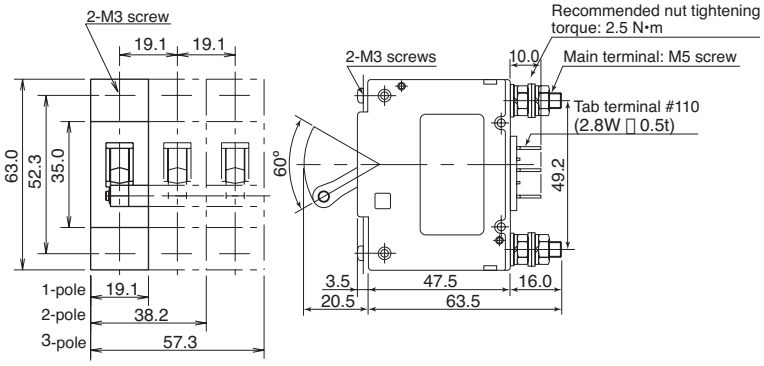


For DC

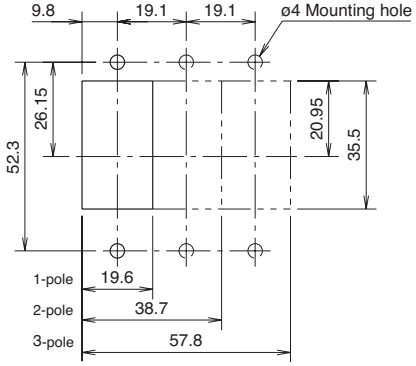




Dimensions



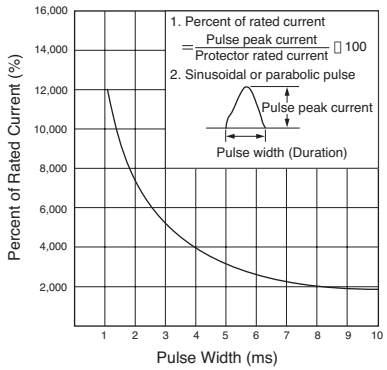
Mounting Hole Layout



All dimensions in mm.

Circuit Protector with Inertia Delay

Circuit protectors equipped with inertia delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on the subsequent overcurrents.



Note: Inertia delay is designed not to trip on a pulse of 20 times the rated current (peak value) for a duration of 8 ms. See the above curve.

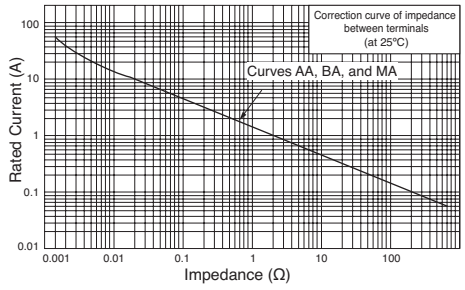
Impedance and Coil Resistance (at 25ºC)

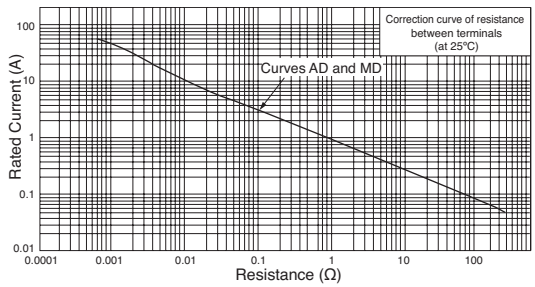
Rated Current (A)	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
	Curves AA, BA, and MA	Curves AD and MD
1	1.1	1
2	0.245	0.227
3	0.11	0.091
5	0.039	0.035
7.5	0.018	0.015
10	0.0124	0.0088
15	0.0065	0.005
20	0.0047	0.003
25	0.0032	0.0023
30	0.0031	0.0019
40	0.002	0.001
50	0.0016	0.0006

Note: Tolerance: ±25% (up to 20A), ±50% (25A or higher)

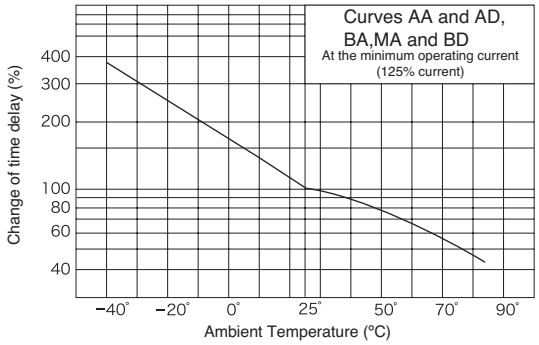
Voltage Drop due to Coil Resistance or Impedance

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 for a power-supply switch, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves in spite of the same rated current, which should be also considered during installation.





Temperature Correction Curve



Time Delay Curve and Ambient Temperature

Since the NRBM series circuit protectors employ an electromagnetic tripping system, the rated current (trip current) is not affected by ambient temperatures, but the time delay varies with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in shorter delay, whereas at lower temperatures the delay will be prolonged.

The time delay curves on the preceding page are at 25ºC. With reference to these curves, time delays can be corrected.

Instructions

Panel Mounting Screw Length

Select a proper screw length according to the table.

Panel thickness (mm)	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.3	2.6	3.2
Without washer	(4)	(4)	5	5	5	5	5	6	6	6
With plain washer (0.5 mm thick)	5	5	5	5	6	6	6	6	6	(7)
With spring washer (0.7 mm thick)	5	5	5	5	6	6	6	6	6	7
With plain washer (0.5 mm thick) and spring washer (0.7 mm thick)	6	6	6	6	6	6	6	(7)	(7)	8

Note: Avoid using screws in the parenthesized lengths whenever possible.

M3 Screw Mounting

Tightening torque: 0.5 N•m minimum
Tightening strength: 1.1 N•m maximum

Installation Angle

Designed to be mounted on a vertical surface in principle, the circuit protector must be mounted on a surface within 10º from a vertical plane. If the circuit protector is mounted on a horizontal surface or at any angle other than specified, the characteristics will be changed.

Multi-pole Type

Multi-pole types such as 2- or 3-pole types are assembled by IDEC. Because of their characteristics, 1-pole type protectors cannot be combined to provide multi-pole types.

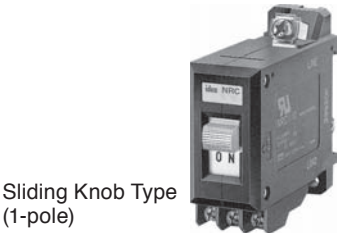
Small and high-performance circuit protectors with rated interrupting capacity 2500A (2-pole type: 1500A) [PSE Molded case circuit breaker] Suited for FA related equipment and control panels.

Sliding knob operator or lever operator
Two-way mounting: DIN rail mounting or screw mounting.
Mounting bracket is available for panel mounting.
Easy-to-view trip indication
Available with auxiliary contacts
Variety of rated currents and time delay curves
Hydraulic-magnetic tripping system and safe trip-free mechanism
Shockproof construction to withstand shocks and vibrations

This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector".

Applicable Standards	Certification Mark	Certification Organization / File No.
UL1077		UL File No. E68029
CSA C22.2 No. 235		No. LR83454
Electrical Appliance and Material safety Law Technical Standard		JET

For details, see the list of standard certified products in the back of this catalog.


Sliding Knob Type (1-pole)


Lever Type (1-pole)


Lever Type (2-pole)

Specifications

Type	AC	DC
Protection Method	Hydraulic-magnetic tripping system	
Internal Circuit	Series trip Series trip (with auxiliary contact)	
No. of Poles	1-, 2-pole	
Rated Voltage	250V AC, 50/60 Hz	65V DC
Rated Current	0.3A, 0.5A, 1A, 2A, 3A, 4A, 5A, 7A, 10A, 15A, 20A, 30A	
Rated Interrupting Capacity	PSE 220V AC, 50/60 Hz, 2500A (2-pole type: 1500A)	65V DC, 1500A (2-pole type: 750A)
Auxiliary Contact Rating	SPDT (contact output) 250V AC / 3A (resistive load), 65V DC / 1A (resistive load)	
Reference Temperature	40°C	
Operating Temperature	–10 to +60°C (no freezing)	
Operating Humidity	45 to 85% RH (no condensation)	
Insulation Resistance	100MΩ min. (with 500V DC megger)	
Dielectric strength	2000V AC, 1 minute (between live part and ground, between terminals of different poles, between terminals of the same pole when main contacts are open, between main circuit and auxiliary contact)	
Vibration resistance	100 m/s^2 (10 to 55 Hz) at the rated current	
Shock resistance	500 m/s^2 at the rated current (auxiliary contact: 300 m/s^2)	
Life	Electrical: 6,000 operations (6 operations per minute at the rated current) Mechanical: 4,000 operations (6 operations per minute)	
Terminal Style	Main terminal: M4 screw terminal (20A max.), M5 screw (30A) Auxiliary terminal: M3.5 screw terminal	
Weight (Approx.)	1-pole type: 115g, 2-pole type: 230g	

Ratings	UL Rating	CSA Rating
Rated Voltage	AC: 250V AC 50/60 Hz DC: 65V DC	
Rated Current	0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 30A	
Rated Interrupting Capacity	1-pole AC: 2,500A DC: 1,500A	1-pole AC: 2,500A DC: 200A
	2-pole AC: 1,500A DC: 1,000A	2-pole AC: 1,500A DC: 200A
Auxiliary Contact Rating	250V AC / 3A, 65V DC / 1A	

Applications

NRC series circuit protectors are small, high-performance overcurrent protectors developed for use in control circuits and small electrical equipment. Due to their ability to be reset many times, a wide range of applications, including replacement of various fuses as in relay circuits, motor circuits, heater circuits, transformers, solenoids, solenoid valves, semiconductors, and many more.

Panels
Automatic control boards, instrumentation boards, power supply boards, electronic control boards, explosion-protected panels.

Machine Tools
Milling machines, drilling machines, grinding machines, presses, electric discharge machines.

Industrial Machines
Injection molding machines, printing presses, spinning machines, elevators, conveyors, cranes.

Chemical and Food Processing Machines
Packaging machines, stirrers, centrifuges, dryers, vacuum equipment.

Communication and Measuring Equipment
Industrial instruments, recording instruments, oscilloscopes, audio systems.

Office Machines
Computer power lines and peripheral equipment, copying machines.

Other Machines and Equipment
Medical equipment, vending machines, hairdresser's equipment, recreation and game machines.

Sliding Knob Operator Type

Specify a rated current in place of 2.

Package Quantity: 1

No. of Poles	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code 2 Rated Current
1	Without	NRC110- 2 AA	0.3A, 0.5A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 30A
		NRC110- 2 EA	
		NRC110- 2 AD	
		NRC110- 2 ED	
	With	NRC111- 2 AA	
		NRC111- 2 EA	
		NRC111- 2 AD	
		NRC111- 2 ED	

Lever Operator Type

Specify a rated current in place of 2.

Package Quantity: 1

No. of Poles	Auxiliary Contact	Type No. (Ordering Type No.)	Designation Code 2 Rated Current
1	Without	NRC110L- 2 AA	0.3A, 0.5A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 30A
		NRC110L- 2 EA	
		NRC110L- 2 AD	
		NRC110L- 2 ED	
	With	NRC111L- 2 AA	
		NRC111L- 2 EA	
		NRC111L- 2 AD	
		NRC111L- 2 ED	
2	Without	NRC210L- 2 AA	0.3A, 0.5A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 30A
		NRC210L- 2 EA	
		NRC210L- 2 AD	
		NRC210L- 2 ED	
	With	NRC211L- 2 AA	
		NRC211L- 2 EA	
		NRC211L- 2 AD	
		NRC211L- 2 ED	

Ordering Information

Specify the type No., rated current and time delay curves.

Note: Use the AC type for use in AC circuits and DC type for use in DC circuits. AC types are not interchangeable with DC types.

[Example]

NRC111 – 30A • AA

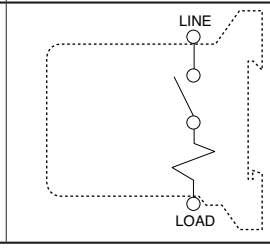
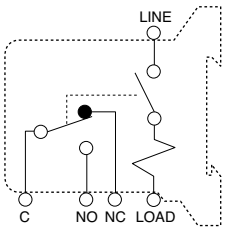
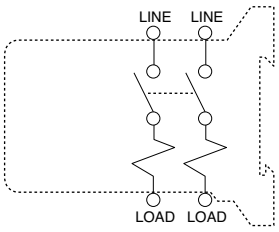
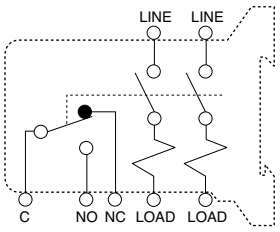
1 Type No. 2 Rated Current 3 Time Delay Curve

NRC110	Sliding knob operator (w/o auxiliary contact)	1-pole
NRC111	Sliding knob operator (w/auxiliary contact)	1-pole
NRC110L	Lever operator (w/o auxiliary contact)	1-pole
NRC111L	Lever operator (w/auxiliary contact)	1-pole
NRC210L	Lever operator (w/o auxiliary contact)	2-pole
NRC211L	Lever operator (w/auxiliary contact)	2-pole

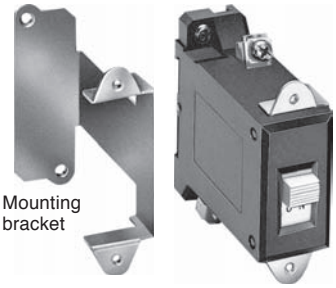
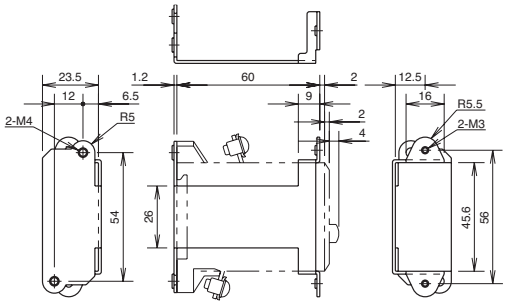
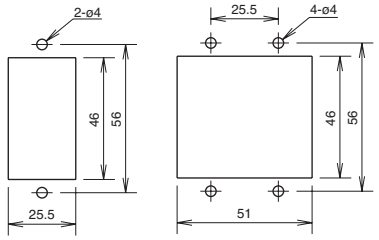
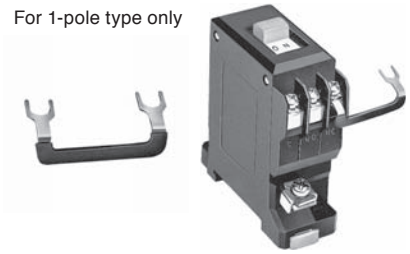
0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A,15A, 20A, 30A

AA	Slow delay type for AC
EA	Fast delay type for AC
AD	Slow delay type for DC
ED	Fast delay type for DC

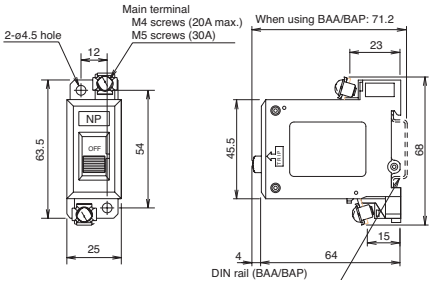
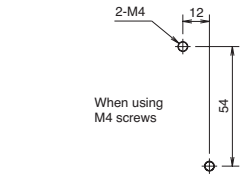
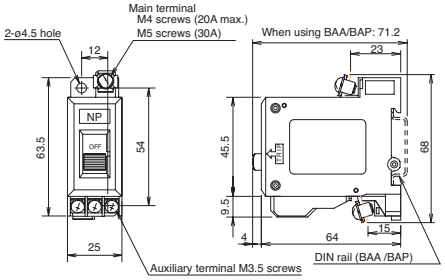
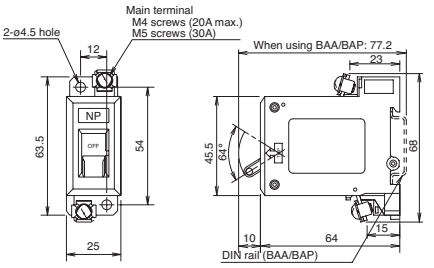
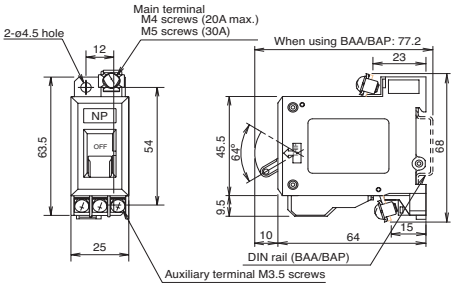
Internal Circuits and Terminal Arrangements

Type	1-pole w/o auxiliary contact	1-pole w/auxiliary contact	2-pole w/o auxiliary contact	2-pole w/auxiliary contact
	NRC110, NRC110L	NRC111, NRC111L	NRC210L	NRC211L
Series Trip				

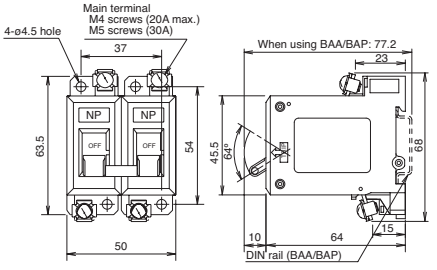
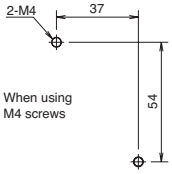
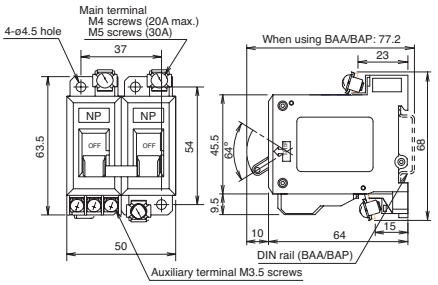
Accessories

Product / Appearance	Type No.	Ordering Type No.	Package Quantity	Description and Dimensions
Mounting Bracket  Mounting bracket (Mounting example of 1-pole type) Note 1: The circuit protectors with auxiliary contacts (NRC111, NRC111L, and NRC211L) cannot be used with mounting brackets. Note 2: For NRC210L (2-pole type), use two mounting brackets for 1 unit (one for each side). Note 3: Wiring can be performed from the rear by using screw terminal adapter (NRC-T).	NRC-M	NRC-MPN02	2	Dimensions  Mounting Hole Layout  (1-pole type) (2-pole type)
Screw Terminal Adapter (for M4/20A max.)  (Two adapters for 1 unit)	NRC-T	NRC-TPN10	10	Use screw terminal adapter for wiring from the rear using the mounting bracket. When screw terminal adapters are used, the terminal length is extended by 12mm. Screw terminal adapters cannot be used for 30A types with M5 terminals.
Auxiliary Terminal Jumper For 1-pole type only 	NRC-J	NRC-JPN10	10	Jumper for auxiliary contact terminal Rated current: 3A

Dimensions and Mounting Hole Layout (1-pole Type)

Type	Type No.	Dimensions	Mounting Hole Layout
Sliding Knob Operator (1-pole)	NRC110 (Without Auxiliary Contact)		 The circuit protectors without auxiliary contacts can be mounted to the panel by using the mounting bracket (optional). See the "Accessories" for the dimensions and mounting hole layout when the mounting brackets are used.
	NRC111 (With Auxiliary Contact)		
Lever Operator (1-pole)	NRC110L (Without Auxiliary Contact)		
	NRC111L (With Auxiliary Contact)		

Dimensions and Mounting Hole Layout (2-pole Type)

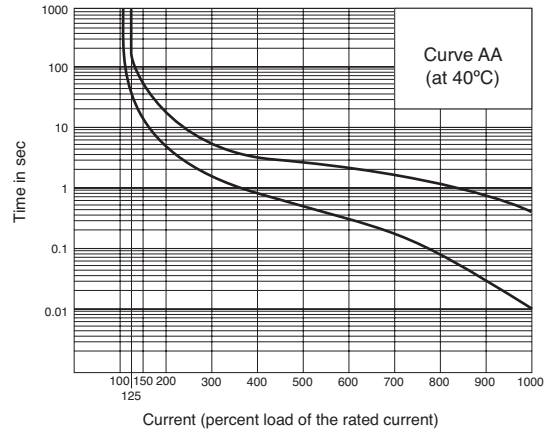
Type	Type No.	Dimensions	Mounting Hole Layout
Lever Operator (2-pole)	NRC210L (Without Auxiliary Contact)		 The circuit protectors without auxiliary contacts can be mounted to the panel by using the mounting bracket (optional).
	NRC211L (With Auxiliary Contact)		

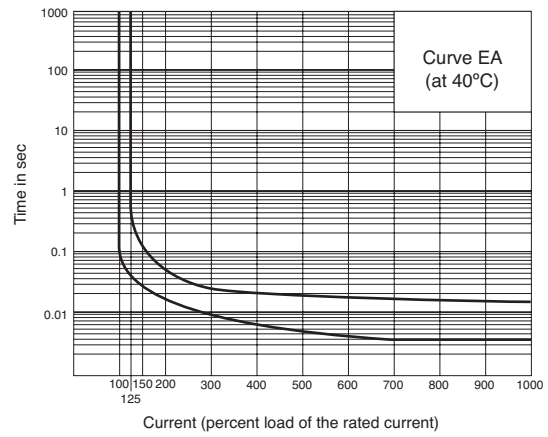
Overcurrent - Time Delay Characteristics (sec at 40 ºC)

Type	Time Delay Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
AC	AA	No Trip	40-240	10-50	3.5-18	0.9-4	0.35-2	0.07-1.2	0.01-0.5
	EA	No Trip	0.05-0.4	0.03-0.17	0.02-0.07	0.008-0.025	0.005-0.018	0.004-0.017	0.004-0.017
DC	AD	No Trip	40-240	10-50	3.5-18	0.6-3	0.008-0.5	0.005-0.09	0.004-0.07
	ED	No Trip	0.04-0.4	0.025-0.15	0.015-0.06	0.007-0.025	0.005-0.018	0.004-0.017	0.004-0.017

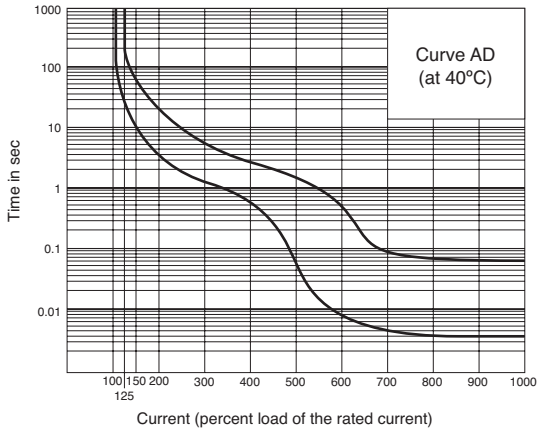
Time Delay Curves

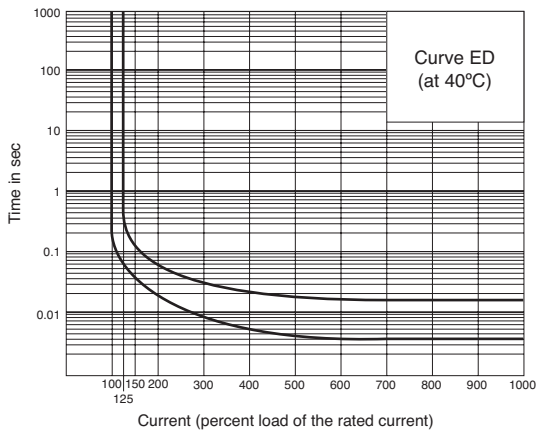
AC





DC





Coil Resistance and Impedance (at 40ºC)

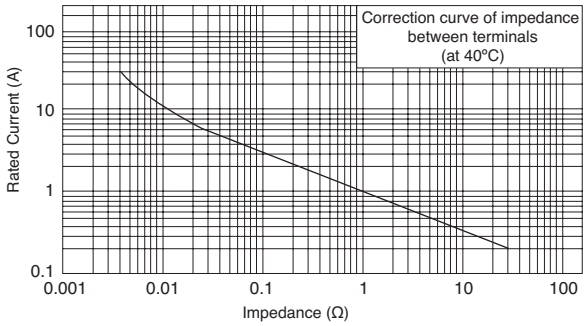
Rated Current	For AC 50/60Hz Impedance (Ω)	For DC Resistance (Ω)
0.3A	15.1	25.6
0.5A	5.58	9.04
1A	1.54	2.33
2A	0.341	0.548
3A	0.162	0.261
5A	0.061	0.099
7A	0.031	0.048
10A	0.017	0.026
15A	0.008	0.013
20A	0.0058	0.0075
30A	0.0039	0.0046

Tolerance: 0.3A to 3A ±10%
5A to 30A ±25%

Voltage Drop due to Coil Resistance or Impedance

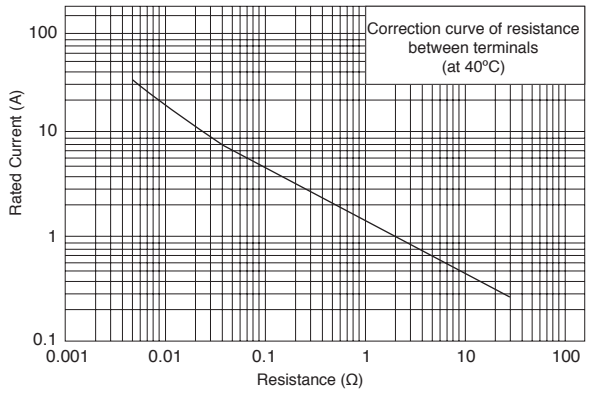
The internal resistance or impedance of circuit protector terminals tends to be larger for smaller rated currents. Therefore, when circuit protectors of small rated currents are used, voltage drop should be taken into consideration.

AC Coil Impedance between Terminals



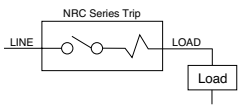
Tolerance: 0.3A to 3A ±10%
5A to 30A ±25%

DC Coil Resistance between Terminals

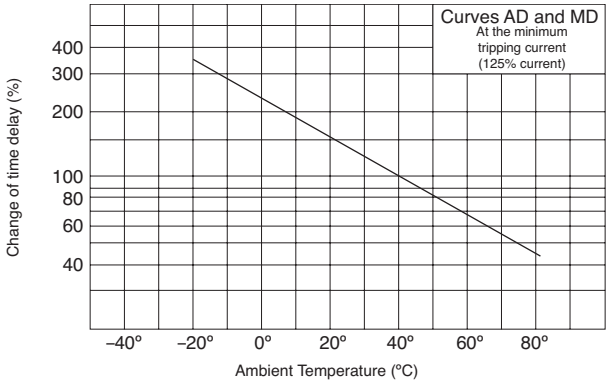


Tolerance: 0.3A to 3A ±10%
5A to 30A ±25%

Wiring Example



Temperature Correction Curve



Time Delay Curve and Ambient Temperature

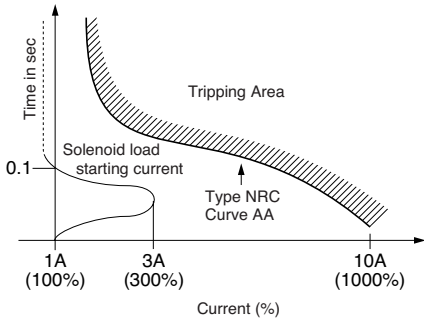
Since the NRC series circuit protectors employ an electromagnetic tripping system, the rated current (trip current) is not affected by the ambient temperatures but the time delay varies with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in shorter delay, whereas at lower temperatures the delay will be prolonged.
The above time delay curves are at 40ºC. With reference to these curves, time delays can be corrected.

Selection Guide

Select an appropriate circuit protector with a required delay curve and rated current in consideration of the characteristics of the circuit or equipment to be protected.

When starting an inductive load, the inrush current reaches up to over ten times the rated current. Select the rated current to prevent tripping at starting current.

Example
Solenoid rating
Rated current
0.7A
Inrush current
3A max.
Inrush time
Approx. 0.1 sec



For solenoid protection such as the above example, NRC circuit protector for the rated current 1A is suited.

For semiconductor element, the joint-use of short delay fuse for semiconductor protection is more effective.

Installation Angle

Designed to be mounted on a vertical surface in principle, the circuit protector should be mounted on a surface within 10º from a vertical plane.
If the protector is mounted on a horizontal surface or at any angle other than specified, the characteristics will be changed.

Snaps into a 16-mm-diameter hole
Wide variety of applications such as office automation equipment

- 16-mm-dia fuse holder size
- More than 1,000 repeat operations
- Snap-on mounting
- Visible trip indicator
- Variety of rated currents
- Available with auxiliary contact which can be used to make an alarm or control circuit
- Solder or quick-connect terminations
- Round design and colorful bezels
- Mounting on 35-mm-width DIN rails is made possible by using a special adapter
- Cycling trip-free mechanism

This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector."

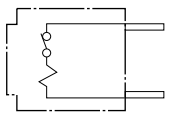
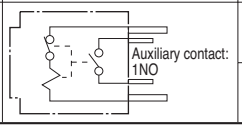
Applicable Standards	Certification Mark	Certification Organization / File No.
UL1077		UL File No. E68029
CSA C22.2 No. 235 (Note 1)		No. LR83454
EN60934 (Note 2)		TÜV Product Service
GB17701		CCC No. 2005010309151798

For details, see the list of standard certified products in the back of this catalog.
Note 1: Only NRF series circuit protectors without manual OFF mechanism are certified by CSA.
Note 2: NRF110, rated current 8A, 10A, and 15A, without manual OFF mechanism

Types

- Specify a rated current and the bezel color code in place of 1 2.

Package Quantity: 1

Auxiliary Contact	Internal Circuit	Manual OFF Mechanism	Type No. (Ordering Type No.)	Standard	Designation Code	
					1 Rated Current	2 Bezel Color
w/o Auxiliary Contact		Without	NRF110 2-1	UL CSA	0.3A, 0.5A	
			NRF110 2-1	UL CSA TÜV (Note)	1A, 2A, 3A, 5A, 8A, 10A, 15A	
		With	NRF210 2-1	UL	0.3A, 0.5A	
			NRF210 2-1	UL	1A, 2A, 3A, 5A, 8A, 10A, 15A	
w/Auxiliary Contact		Without	NRF111 2-1	UL CSA	0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A	
		With	NRF211 2-1	UL CSA		

Bezel Color	Code
Black	Blank
Green	G
Red	R
Blue	S
White	W
Yellow	Y

Note: TÜV approved models are for 8A, 10A, and 15A only. When ordering the TÜV approved models, specify "-EN" at the end of the Type No.

Ordering Information

When ordering, specify the Type No. the rated current, and the bezel color code.

[Example]

NRF 2 11 R - 3A

- Type
- Manual OFF Mechanism

Without	1
With	2

- Auxiliary Contact

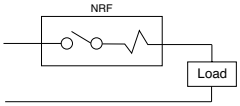
Without	10
With	11

1 Rated Current: 0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A

2 Bezel Color

Bezel Color	Code
Black	Blank (standard color)
Green	G
Red	R
Blue	S
White	W
Yellow	Y

• Wiring Example



• Manual OFF Mechanism

Manual OFF mechanism opens the main contacts by pressing the button, convenient for checking the circuit with power OFF. When manually turning OFF, make sure that the current is not applied (under no-load condition).

Specifications

Protection Method	Thermal tripping
Internal Circuit	Series trip Series trip (w/auxiliary contact)
No. of Poles	1 pole
Rated Voltage	250V AC, 32V DC
Rated Current	0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A
Minimum Applicable Load	24V AC/DC 100mA (reference value)
Rated Interrupting Capacity	300 mA to 5A: Rated current × 6 8, 10, and 15A: Rated current × 10
Auxiliary Contact Rating	1NO (contact output) 125V AC / 32V DC, 50mA
Reference Temperature	25ºC
Operating Temperature	–10 to +60ºC (no freezing)
Operating Humidity	45 to 85% RH (no condensation) (Note 1)
Trip Time (at 25 ºC)	• No trip at the rated current • Within 1 hour at 135% the rated current
Reset Time	60 sec minimum (Note 2)
Vibration Resistance	100 m/s^2 (10 to 55 Hz)
Shock Resistance	Damage limits: 1000 m/s^2, Operating extremes: 500 m/s^2
Life	• Overcurrent durability: 1,000 operations minimum (tripping at 200% the rated current) • Mechanical life (with manual OFF mechanism): 240 operations minimum (switching at no load)
Insulation Resistance	100 MΩ minimum (500V DC megger)
Dielectric Strength	• Between main contacts and between main contact and ground: 2000V AC, 1 minute • Between main and auxiliary contacts: 1500V AC, 1 minute
Terminal Style	Main terminal: Tab terminal #250 Auxiliary contact terminal: 1.4W × 0.2mm thick solder terminal
Weight (Approx.)	15g

Note 1: The rated current is the value at the reference ambient tempera ture of 25ºC, and varies with the operating temperature. The rated current can be corrected according to the temperature correction curve.

Note 2: Reset time is the value at the reference ambient temperature of 25ºC.

Applications

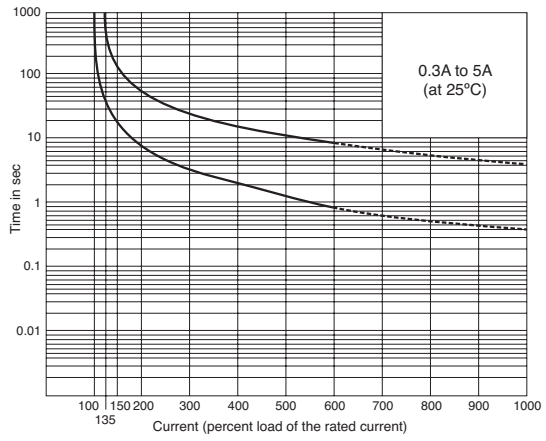
NRF series circuit protectors are small, high-performance overcurrent protectors developed for use in control circuits and small electrical equipment. Because they can be easily reset, they are suited for use in relay circuits, motor circuits, heater circuits, transformers, solenoids, solenoid valves, semiconductor circuits, and many other applications.

[Application Examples]

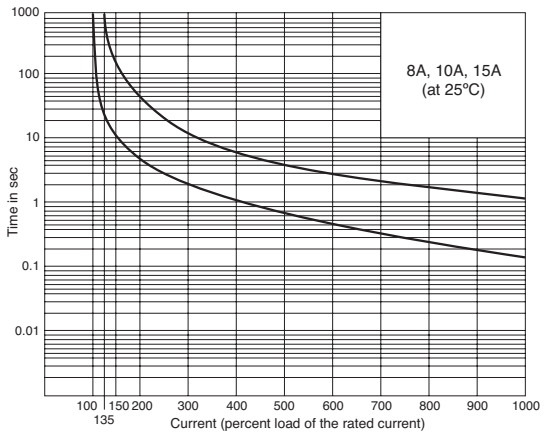
- **Office Automation Equipment**
  Copiers, shredders, personal computers, word processors, fax machines, printers, computer terminals, communication equipment, and power supplies.
- **Measuring Instruments**
  Electrical measuring instruments, industrial meters, analyzers, recorders, data processors, test equipment, and chemical equipment
- **Industrial Machines**
  CNC equipment, robots, molding machines, processing machines, packaging machines, and carriers
- **Business machines**
  Medical equipment, vending machines, hairdresser's equipment, recreation and game machines, and small printing machines
- **Electric Controller and Instrumentation Equipment**
  Automatic control devices, electronic equipment, and instrumentation boards

Time Delay Curves

Rated Current 0.3A to 5A



Rated Current 8A, 10A, 15A



Note: Dashed lines are reference values.

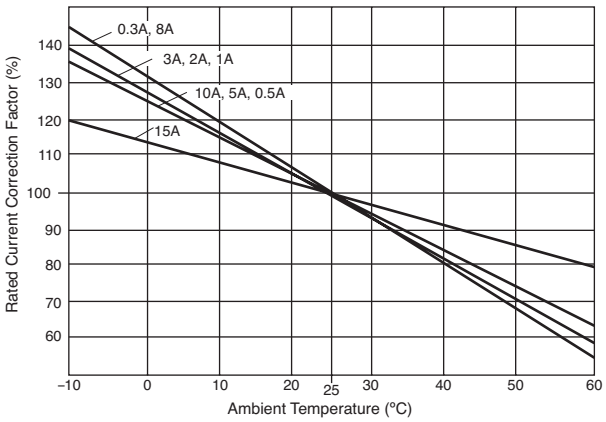
Rated Current vs Internal Resistance

Rated Current	Internal Resistance (Ω) ±15%	Remarks
0.3A	9.08	at 25°C
0.5A	3.27	
1A	0.81	
2A	0.235	
3A	0.0922	
5A	0.0503	
8A	0.0085	
10A	0.0095	
15A	0.0064	

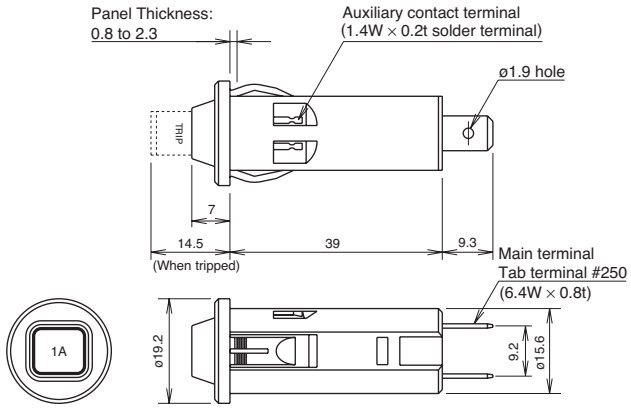
The internal resistance tends to be larger for smaller rated currents. When the circuit protector is used in a low-voltage circuit, voltage drop should be taken into consideration.

Temperature Correction Curve

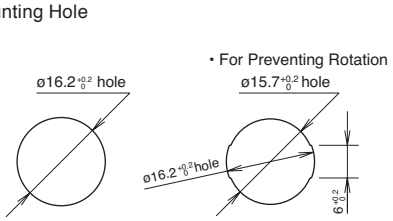
The rated current is based on an ambient temperature of 25°C. Since a thermal tripping method is employed, the rated current should be corrected according to the ambient temperature with reference to the curves shown below.



Dimensions



Mounting Hole

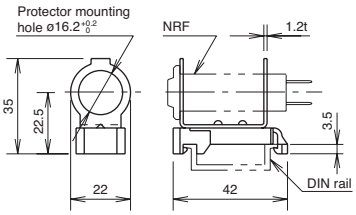


* Chamfering on the front edge of the mounting hole is recommended for easy insertion.

Accessories (optional)

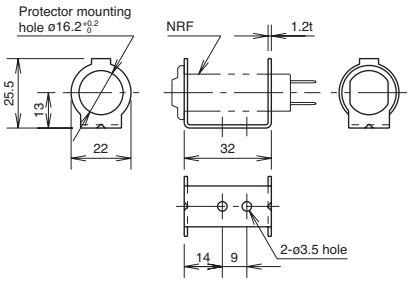
• 35-mm-wide DIN Rail Mount Adapter

Type No.	Ordering Type No.	Package Quantity
NRF-D	NRF-DPN05	5



• Surface Mount Adapter

Type No.	Ordering Type No.	Package Quantity
NRF-M	NRF-MPN10	10



All dimension in mm.

Instructions

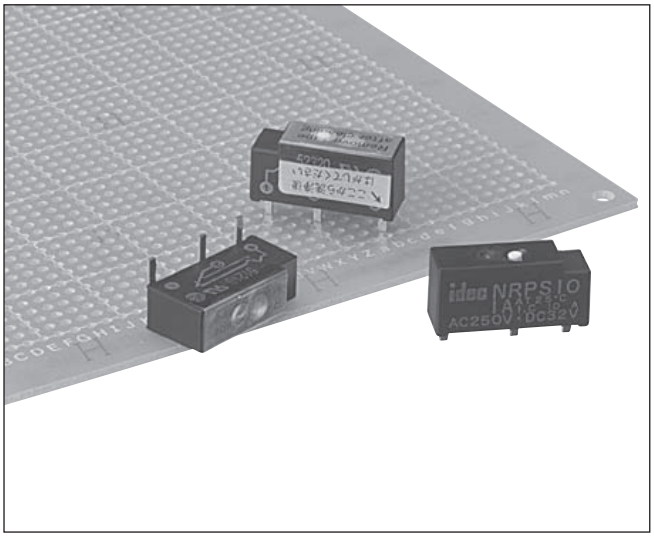
1. Since the NRF is designed for protection against overload, it should be used within the rated interrupting capacity. An excessive overcurrent may affect the bimetal characteristics or damage the internal mechanism.
2. After tripping, the NRF cannot be reset until the bimetal cools down. Allow the NRF at least 60 seconds before resetting. When the NRF is used at an ambient temperature higher than the reference temperature, resetting sometimes fails even after 60 seconds because it takes a long time to cool down the bimetal.
3. The NRF may not trip at an instantaneous overcurrent due to its principle.
4. The NRF is shipped in the ON status. To confirm operation of the models without manual OFF mechanism, apply approximately 200% the rated current to trip the NRF.
5. When installing quick connect receptacles to the terminals, hold the NRF body and press it into the quick connect receptacles.
6. Unlike conventional switches, the models with manual OFF mechanism are not suited for frequent switching due to their construction. (Their mechanical life is 240 operations at minimum when switching at no load.)
7. The models with manual OFF mechanism should be operated without load.

NRP Series PC Board Circuit Protectors

Higher economic efficiency than a fuse

SIL type subminiature circuit protectors adopting IC terminal arrangements, and mountable directly on PC boards
Simple construction and high performance applying a positive load reversing mechanism by IDEC's original design
Unlike fuses, the thermal trip mode (bimetal type) eliminates erroneous interruption due to inrush currents.
Rated current can be selected to meet the load. Circuits with high inrush currents can be protected against overloads (unlike fuses).
Reusable 200 operations (tripping at 200% the rated current) with higher economic efficiency, and less maintenance than fuses.
Available in slim and flat types. Slim types (can be mounted on PC boards by using pick and place machines)
Available in non-sealed and sealed types. With the sealed type, cleaning after soldering is possible.
With a manual OFF mechanism, convenient for circuit checkups

This product is recognized by Underwriters Laboratories under UL1077 as a "Supplementary Protector."

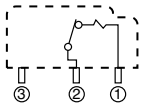
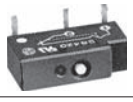
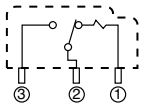
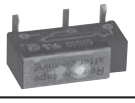


Applicable Standard	Certification Mark	Certification Organization File No.
UL1077		UL File No. E68029
CSA C22.2 No. 235		No. LR65560

For details, see the list of standard certified products in the back of this catalog.

Types

Specify a rated current in place of ☐.

Type		Appearance	Type No.	Ordering Type No.	☐ Rated Current	Contact	Internal Circuit (Note)	Package Quantity
NRPS (Slim Type)	Non-sealed		NRPS10-☐	NRPS10-☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A,6A	1NC		10
	Sealed (Tape-sealed)		NRPS10-G☐	NRPS10-G☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	1NC		10
NRPF (Flat Type)	Non-sealed		NRPF10-☐	NRPF10-☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	1NC		10
	Sealed (Tape-sealed)		NRPF10-G☐	NRPF10-G☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	1NC		10
NRPS (Slim Type)	Non-sealed		NRPS11-☐	NRPS11-☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	SPDT		10
	Sealed (Tape-sealed)		NRPS11-G☐	NRPS11-G☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	SPDT		10
NRPF (Flat Type)	Non-sealed		NRPF11-☐	NRPF11-☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	SPDT		10
	Sealed (Tape-sealed)		NRPF11-G☐	NRPF11-G☐PN10	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A	SPDT		10

Note: Terminal ③ on 1NC contact type is provided for firm mounting on printed-circuit boards, without internal connections.

Ordering Information
When ordering, select appropriate circuit protectors in consideration of the soldering method and necessity of cleaning.

Selection Guide - Select appropriate circuit protectors (marked with X in the table below) according to your application.

Applications	Slim Type		Flat Type	
	Non-sealed	Sealed	Non-sealed	Sealed
	NRPS10-☐ NRPS11-☐	NRPS10-G ☐ NRPS11-G ☐	NRPF10-☐ NRPF11-☐	NRPF10-G ☐ NRPF11-G ☐
Manual soldering	X	X	X	X
Dip soldering	—	X	—	X
Cleaning after soldering	—	X	—	X
Automatic mounting on PC boards	X	X	—	—

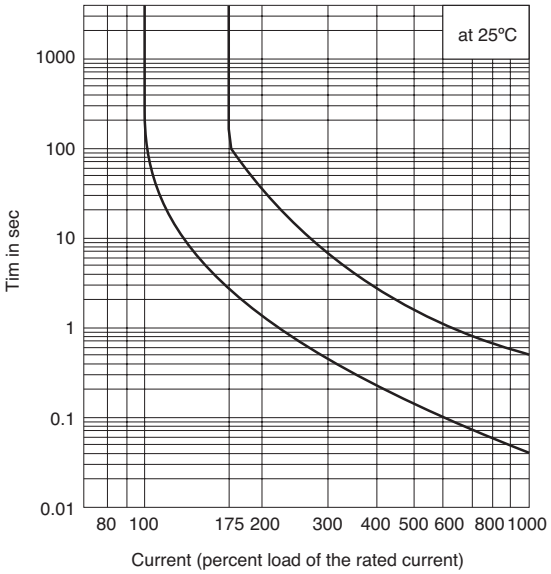
Note: The sealed type is provided with epoxy-seal on the base and a tape seal on the actuator side. After cleaning, be sure to remove the tape seal.
When using flux, use rosin flux. Select the sealed type irrespective of cleaning necessity.

Specifications

Protection Method	Thermal tripping
Internal Circuit	Series Trip
No. of Poles	1 pole
Rated Voltage	250V AC (50/60Hz), 32V DC
Rated Current	1A, 1.6A, 2A, 3.15A, 4A, 5A, 6A
Rated Interrupting Capacity	1 to 4A: Rated current x 10 (resistive load) 5 and 6A: 250V AC/40A, 32V DC/40A (resistive load)
Minimum Applicable Load	5V AC/DC 100 mA (reference value)
Reference Temperature	25ºC
Operating Temperature (Note)	−10 to +50ºC (no freezing)
Operating Humidity	45 to 85% RH (no condensation)
Storage Ambient Temperature	−30ºC to +70ºC (no freezing)
Storage Ambient Humidity	45 to 85% RH (no condensation)
Vibration Resistance	100 m/sec^2 (10 to 55 Hz)
Shock Resistance	Damage limits: 1000 m/s^2 Operating extremes: 500 m/s^2
Life	200 operations (tripping at 200% the rated current)
Insulation Resistance	100 MΩ minimum (500V DC megger)
Dielectric Strength	1500V AC (50/60Hz), 1 minute (between terminals of the same pole when main contacts are open, and between live parts and ground)
Initial contact	Between terminals① and ②: 200 mΩ maximum (5V DC • 1A) Between terminals② and ③: 100 mΩ maximum (5V DC • 100mA)
Weight (Approx.)	2g

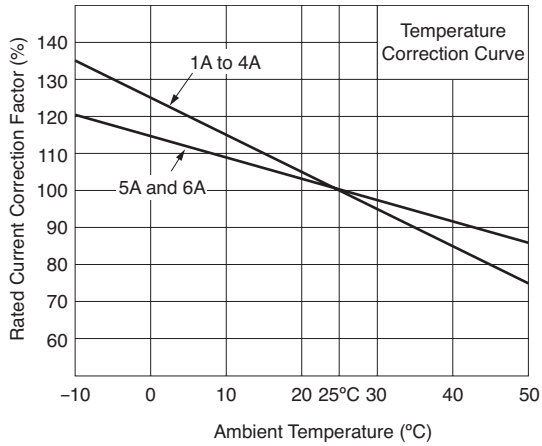
Note: The rated current is the value at the reference ambient temperature of 25ºC, and varies with operating temperature. The rated current can be corrected according to the Temperature Correction Curve.

Time Delay Curves



Temperature Correction Curve

The rated current is based on an ambient temperature of 25ºC. Since a thermal tripping method is employed, the rated current should be corrected according to the ambient temperature with reference to the curve shown below.

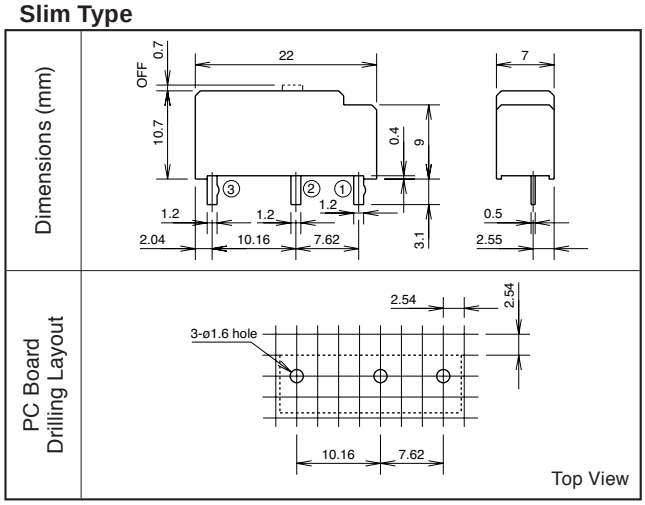


Overcurrent - Time Delay Characteristics (sec at 25ºC)

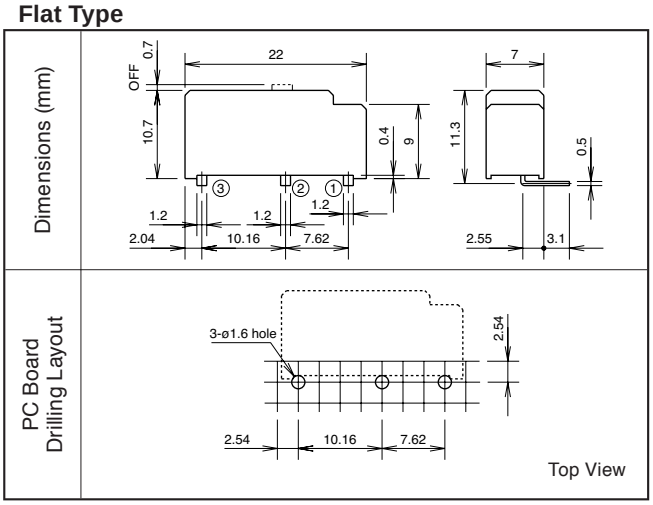
Percent of Rated Current	100%	175%	200%	400%	600%	800%	1000%
Time Delay	No Trip	2.2-120	1.2-40	0.24-2.2	0.1-1	0.06-0.7	0.04-0.5

Dimensions and PC Board Drilling Layout

Slim Type

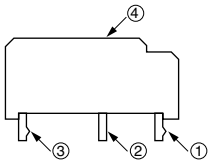


Flat Type

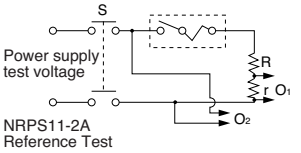


Dielectric Strength Test

NRPS11 / NRPF11 } 100 units in total



Short-circuit Test (AC)

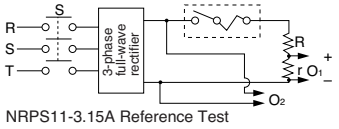


NRPS11-2A Reference Test

S : Switch
R : Load resistance
r : Shunt resistance for current measurement
O_1: Current measurement
O_2: Voltage measurement

Data
- Power voltage: 220V AC, Frequency: 60Hz
- Short-circuit current (effective value): 20A
- Power factor: cosø = 1 (4 cycles after power is applied)

Short-circuit Test (DC)

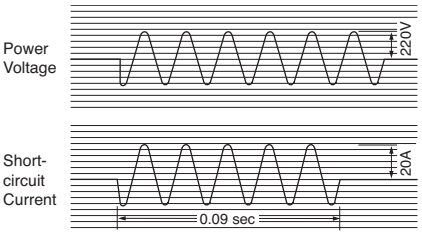


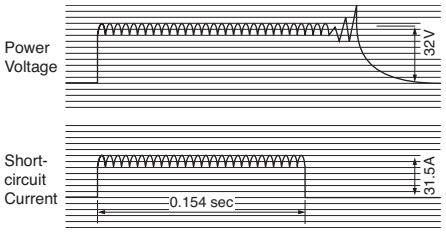
NRPS11-3.15A Reference Test

S : Power switch (Solenoid switch)
R: Load resistance
r: Shunt resistance for current measurement (30A / 100mV)
O_1: Current measurement
O_2: Voltage measurement

Data
- Power voltage: 32V DC
- Short-circuit current: 31.5A

Item	1500V AC 1 minute	Critical Values		
		X	MIN	MAX
Between terminals (Open) ① – ② & ③	Normal	2800	1700	3400
Between terminals (Open) ② – ③ & ①	Normal	2740	2700	3400
Between housing and terminal ④ – ① & ② & ③	Normal	3600	3300	3800





Applications of NRPS/NRPF Circuit Protectors

The NRPS/NRPF series circuit protectors are ideal for use on printed-circuit boards in small electric appliances to protect power transformers, rectifiers, small-motors, solenoid valves, and solenoids from overloads.
In addition to higher economic efficiency than that of fuses, the capability of over 200 repeated uses will find a wide range of applications in place of various fuses.

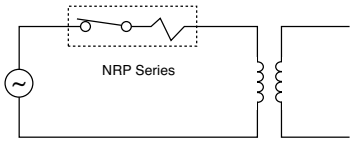
Applications Examples

Office Automation Equipment: Copiers, Shredders, Fax machines,
Tools: Machine tools, Hydraulic devices, Robots, etc.
Measuring equipment: Testers, Oscilloscopes, etc.
Communication Equipment: Transmitter/Receiver, Telephone Exchanger
Power Supplies: Switching Power Supplies, Small Generators

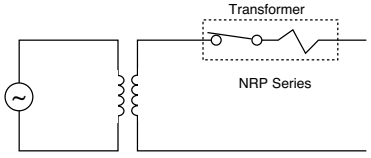
Application Circuits Example

Transformer Protection Example

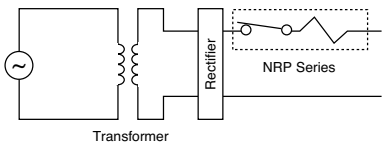
Transformer Primary Protection



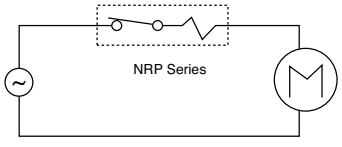
Transformer Secondary Protection



Rectifier Protection Example



Motor Coil Protection



Safety Precautions

1. Soldering

(1) • Soldering to the printed-circuit boards
Soldering should be done quickly referring to the conditions below. If the terminals are heated excessively, the bimetal may trip.
• Manual soldering
For manual soldering, complete soldering with a 60W soldering iron (soldering tip temp.: 350ºC) quickly with in 3 seconds. (When lead-free soldering is used, Sn-Ag-Cu is recommended.)
During soldering, keep the soldering iron away from the plastic housing of the circuit protector, and apply no external force by bending the terminal or pulling the wires.
(Check your actual soldering conditions before soldering.)
• Dip soldering
Dipping temperature: 260ºC
Dipping duration: 5 seconds maximum

(2) Do not solder the sealed type in a flow soldering bath. Since preheating process weakens the viscosity of the tape seal on the actuator due to the air expansion inside NRPS and the NRPF, air-tightness is possibly lowered.

(3) For the non-sealed type, perform manual soldering. Do not use the water-soluble flux because it runs into the unit and it causes malfunctions.

(4) Non-corrosive rosin flux is recommended because washing is not required.

2. Washing

(1) When there is a possibility of washing, select the seal type.

(2) Washing should be done at 60ºC maximum within 30 seconds (and 50mm depth for full washing). Avoid steam washing. Use pure water as a cleaning solvent. When an organic solvent is used, use of alcohol is recommended. Before using other organic solvents, make sure that after actual washing, the tape seal is not removed and sealant or housing material is not affected.

(3) The base of sealed type is provided with epoxy resin sealing and a tape seal covers the actuator. After cleaning, be sure to remove the tape from the actuator before use.

3. Notes for Bimetal

(1) Storage temperature should not exceed 70ºC. If storage temperature exceeds 70ºC, the bimetal may trip.

(2) Applied current should be under the rated current for the normal use. The rated current should be corrected according to the ambient temperature chart due to bimetal characteristics.

(3) Since the NRPS and NRPF are designed for protection against overloads, they should be used within the rated interrupting capacity. An excessive overcurrent may affect the bimetal characteristics or damage the internal mechanism.

(4) Note that the NRPS and NRPF do not respond to overcurrent for a period of few tens to few hundreds msec.

4. Manual OFF Mechanism

Manual OFF mechanism is performed by slightly pulling the white pin at the top of the unit with tweezers.

5. Other Notes

(1) Make sure that no load (current) is applied before resetting manually turning the circuit OFF with actuator operation. In addition, avoid frequent opening and closing of the actuator at no load (current is not applied).

(2) Turn power off and allow at least 60 seconds before rethrowing (at reference ambient temperature of 25ºC). Reset the protector with no load. Do not press the actuator with something sharp, otherwise the internal part may be damaged.

(3) Do not hold the actuator depressed while an overcurrent is present, because the overcurrent may damage the circuit protectors.