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## Circuit Protectors

Circuit Protector Selection Guide


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


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* Protectors indicated with (RE) are for the switch type.

Also, the series trip and relay trip types of NRL series are excluded from


Circuit Protector Selection Guide

*1: Reset time is the value at the reference ambient temperature of $25^{\circ} \mathrm{C}$.
*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.


## 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.


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.

-Applications by Time Delay Curve

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

## NH1 series Circuit Protectors

Wide Range of Applications frominefoinanoteftemation and Consumer Use to Factory Automation.

- Compact, lightweight, and high-performance circuit protectors.
- Rocker type snaps into a panel.
- Rated voltage: 250 V 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 <br> Mark | Certification Organization / <br> File No. |
| :--- | :---: | :--- |
| UL1077 |  |  |
| CSA C22.2 No. 235 (Note 1) | C | US | UL/c-UL File No. E68029



- Rocker Type NH1Y

- Lever Type NH1S

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
Specifications


## Circuit

 Protectors
## Power

Supplies

PLCs \& SmartRelay

Operator Interfaces

Sensors

Control
Stations

Explosion Protection

References

NH1 Series Circuit Protectors

- Rocker Color, Rocker Indication
(NH1Y/NH1L)

| Rocker Color <br> (Code) | Black (blank) <br> Red (R), Green (G), White (W) |  |
| :---: | :---: | :---: |
|  | $\bullet$ | ON <br> OFF |
| Rocker <br> Indication <br> (Code) | (blank) | (A) |

- Operating Voltage of Indicator

| NH1L) |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  | Code |
| Neon (Red) | 125 V AC, $50 / 60 \mathrm{~Hz}$ (operating voltage: 100 to 125V AC) |  | 1 |
| LED (Red) [Note] | For AC/DC (operating voltage: within $+10 \%$ of the rated voltage) | 6 V | 3 |
|  |  | 12V | 4 |
|  |  | 24 V | 5 |
|  |  | 48 V | 6 |

Note: Both types of indicators contain a currentlimiting resistor.

## - Lever Color (NH1S, NH1V):

Black
[Type No. Example]

## Type No. Development



- 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 <br> 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 <br> Position | NO Contact | NC Contact |
| :--- | :---: | :---: |
| ON | Open | Closed |
| Tripped | Closed | Open |
| OFF | Open | Closed |

Not possible to designate with voltage
trip type trip type.


3-pole type is available with NH1S Series Trip, NH1S Relay Trip, and NH1V.
Note: Dual coil type is available with
1-pole and
2-pole types
only.
 NH1V.


Dual-coil type: Blank "w/Alarm Contact" type is available with NH 1 S and

| 8 |
| :--- |
|  |



| $10 \quad$ |
| :--- |
| $\square$ |



To be designated for voltage trip and dual coil types.

## NH1S (Lever Type) Type No.

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- Specify a rated current, time delay curve, and rated voltage in place of 78 8. $8 . \quad$ Package Quantity: 1



## Relays \&

## NH1Y (Rocker Type) Type No.

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- Specify a rated current, time delay curve, rated voltage, rocker indication, and rocker color in place of 7891112.

Package Quantity: 1

| Internal Circuit | No. of Poles | Terminal Style | Inertia Delay | Auxiliary Contact Alarm Contact | Type No. <br> (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-1100-7781112 | 0.5 A0.75 A1 A2 A3 A5 A7.5 A10 A15 A20A25A30A | AA <br> BA <br> MA <br> AD <br> MD |  | Blank,$\mathrm{A}, \mathrm{C}, \mathrm{D}$ | Blank, <br> R, G, W |
|  |  |  |  | w/Auxiliary Contact | NH1Y-1111-781112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  |  | With | Without | NH1Y-1100F-781112 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-1111F- 78112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  | Screw Terminal | Without | Without | NH1Y-1100S-781112 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-1111S-781112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  |  | With | Without | NH1Y-1100FS-7811112 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-1111FS- 781112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
| Series Trip Current Trip | 2 | Tab Terminal | Without | Without | NH1Y-2100-7811 12 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-2111-781112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  |  | With | Without | NH1Y-2100F-78116 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-2111F-7 7112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  | Screw Terminal | Without | Without | NH1Y-2100S-78116 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-2111S- 781112 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
|  |  |  | With | Without | NH1Y-2100FS-781112 |  |  |  |  |  |
|  |  |  |  | w/Auxiliary Contact | NH1Y-2111FS-7811 12 |  |  |  |  |  |
|  |  |  |  | w/Alarm Contact | - |  |  |  |  |  |
| Relay Trip Voltage Trip | 1 | Tab Terminal | Without | Without | NH1Y-1500-9 1112 | - | - | $\begin{aligned} & 100 \mathrm{~V} \text { AC } \\ & 24 \mathrm{~V} \text { DC } \end{aligned}$ | Blank, <br> A, C, D | Blank, <br> R, G, W |
|  | 2 |  |  | Without | NH1Y-2500-91112 |  |  |  |  |  |
|  | - |  |  | - | - |  |  |  |  |  |

## NH1L (Rocker Type) Type No.

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- Specify a rated current, time delay curve, reated vooffage, indicator, rocker indicator, and rocker color in place of 7 8 9 101112.

Package Quantity: 1


## NH1V (Lever Type) Type No.

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- Specify a rated current, time delay curve, and rated voltage in place of 780 . Package Quantity: 1


Internal Circuits and Terminal Arrangements


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.

NH1 Series Circuit Protectors
Overcurrent - Time Delay Characteristics (sec at $25^{\circ} \mathrm{C}$ ) [at vertical mounting]

| For | Time Delay Curve | onlinecomponents.c\%ament of Rated Current |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 100\% | 125\% | 1980\% | 200\% | 400\% | 600\% | 800\% | 1000\% |
| $\begin{aligned} & \mathrm{AC} \\ & 50 / 60 \mathrm{~Hz} \end{aligned}$ | 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\% |
| $\begin{aligned} & \mathrm{AC} \\ & 50 / 60 \mathrm{~Hz} \end{aligned}$ | 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



Current (percent load of the rated current)


Current (percent load of the rated current)


Current (percent load of the rated current)

## For DC



Current (percent load of the rated current)


Current (percent load of the rated current)

## Time Delay Curve and Ambient Temperature

Since NH1 series circuit protectors employ aroalinneconnponéntsicom ping system, the rated current (trip current) is notaffected by"ambis ent 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 $25^{\circ} \mathrm{C}$. With reference to these curves, time delays can be corrected.

## Temperature Correction Curve

The time delay curves are at $25^{\circ} \mathrm{C}$. With reference to the following figure, time delays can be corrected.


## Impedance and Coil Resistance

- Series Trip Type
[Current Trip Type]

|  | For AC $50 / 60 \mathrm{~Hz}$ Impedance ( $\Omega$ ) | For DC Resistance ( $\Omega$ ) |  | For AC $50 / 60 \mathrm{~Hz}$ Impedance ( $\Omega$ ) | For DC Resistance ( $\Omega$ ) |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | 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: $\pm 25 \%$ (up to 5 A ), $\pm 50 \%$ (7.5A or higher)

- Relay Trip Type
[Voltage Trip Type]

| Rated Voltage | For AC $50 / 60 \mathrm{~Hz}$ <br> Impedance $(\Omega)$ | For DC Resistance $(\Omega)$ |
| :---: | :---: | :---: |
| 100 V AC | 1350 | - |
| 24 V DC | - | 248 |

- Dual Coil Type
[Current Trip Type]

| Rated <br> Current | For AC 50/60Hz <br> Impedance $(\Omega)$ | For DC Resistance ( $\Omega$ ) |
| :---: | :---: | :---: |
|  | Curves AA, BA, and MA | Curves AD and MD |
| 2 A | 0.308 | 0.307 |
| 3 A | 0.129 | 0.127 |
| 5 A | 0.0509 | 0.0518 |
| 7.5 A | 0.0249 | 0.0245 |
| 10 A | 0.0150 | 0.0150 |
| 15 A | 0.0084 | 0.0080 |

Note: Tolerance: $\pm 25 \%$ (up to 5 A ), $\pm 50 \%$ (7.5A or higher)
[Voltage Trip Type]

| Rated Voltage | For AC 50/60Hz <br> Impedance $(\Omega)$ | For DC Resistance $(\Omega)$ |
| :---: | :---: | :---: |
| 100 V AC | 321 | - |
| 24 V DC | - | 15.7 |

Note: Tolerance: $\pm 25 \%$

## 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 .


- 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.



NH1 Series Circuit Protectors

## Dimensions

[NH1S]
-1-pole Type
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-2-pole Type


## -3-pole Type


[NH1Y • NH1L]


Dimensions
[NH1V]
-1-pole Type

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Series Trip (Auxiliary/Alarm Contacts)


Relay Trip

## -2-pole Type


-3-pole Type


Accessories (Optional)


## Mounting Hole Layout

[NH1S]
-1-pole Type

[NH1Y • NH1L]
-1-pole Type


- Determine the dimension A within the panel thickness using the following formula:
Dimension A $(\mathrm{mm})=50.4+($ Panel thickness -0.8$) \times 0.87$
Applicable panel thickness: 0.8 to 3.2 mm
- 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 $\quad \square$ | 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: $0.5 \mathrm{~N} \cdot \mathrm{~m}$ minimum
Tightening strength: $0.7 \mathrm{~N} \cdot \mathrm{~m}$
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## -2-pole Type


-2-pole Type


正

## -3-pole Type


[NH1V]


## - 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 $) \times 125 \% \times$ (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 $390^{\circ} \mathrm{C}$ within 10 seconds using a 60W soldering iron.
Solder the auxiliary/alarm terminal at a temperature of $350^{\circ} \mathrm{C}$ 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 $5.5 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| 2. Applicable crimping terminal | R1.25-4 to R5.5-4 |
| 3. No.of crimping terminal | 1 |
| 4. Tightening torque | 1.0 to $1.2 \mathrm{~N} \cdot \mathrm{~m}$ |
| 5. Tensile strength <br> (Static 1 minute) | Axial direction: 80 N <br> Transverse direction: 20 N |

Thrust force (screw pressing load) in screw tightening should be 29 N 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 50 N without deforming the terminal.

## NRA series Circuit Protectors

## Best Selling Circuit Protectoranlinecomponents.com 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 <br> Mark | Certification Organization / <br> File No. |
| :--- | :---: | :--- |
| UL1077 <br> CSA C22.2 No. 235 (Note 1) | C | US | UL/c-UL File No. E68029



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



- Indicator Ratings (Illuminated rocker unit)

| Indicator | Rated Voltage |
| :--- | :--- |
| Neon | 100 to $110 \mathrm{~V} \mathrm{AC} ,50 / 60 \mathrm{~Hz}$ <br> 200 to $220 \mathrm{~V} \mathrm{AC}, 50 / 60 \mathrm{~Hz}$ |
| LED | 4 to 8 V DC |

## - Standard Color

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

## Type No. Development

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Type No. Examples
(1) Circuit protector: Lever type

(2) Circuit Protector: Illuminated rocker type


## NRAS (Lever Type)

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- Specify a rated current, time delay curve, and rated voltage in place of 789.

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## NRAS (Lever Type)

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- Specify a rated current, time delay curve, and rated voltage in place of 780. Package Quantity: 1

| Internal Circuit | No. of Poles | Terminal Style | Inertia Delay | Flush Plate | Auxiliary Contact Alarm Contact | Type No. <br> (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 | NRAS300-78 | $\begin{array}{r} 0.3 \mathrm{~A} \\ 0.5 \mathrm{~A} \\ 0.75 \mathrm{~A} \\ 1 \mathrm{~A} \\ 2 \mathrm{~A} \\ 3 \mathrm{~A} \\ 5 \mathrm{~A} \\ 7.5 \mathrm{~A} \\ 10 \mathrm{~A} \\ 15 \mathrm{~A} \\ 20 \mathrm{~A} \\ 25 \mathrm{~A} \\ 30 \mathrm{~A} \end{array}$ | AA <br> BA <br> MA <br> AD <br> MD | - |
|  |  |  |  |  | w/Auxiliary Contact | NRAS3111-78 |  |  |  |
|  |  |  |  |  | w/Alarm Contact | NRAS3121-78 |  |  |  |
|  |  |  | With | Without | Without | NRAS3100F-78 |  |  |  |
|  |  |  |  |  | w/Auxiliary Contact | NRAS3111F-78 |  |  |  |
|  |  |  |  |  | w/Alarm Contact | NRAS3121F-78 |  |  |  |
|  |  | Screw Terminal | Without | Without | Without | NRAS3100S-78 |  |  |  |
|  |  |  |  |  | w/Auxiliary Contact | NRAS3111S-78 |  |  |  |
|  |  |  |  |  | w/Alarm Contact | NRAS3121S-78 |  |  |  |
|  |  |  | With | Without | Without | NRAS3100FS-78 |  |  |  |
|  |  |  |  |  | w/Auxiliary Contact | NRAS3111FS-78 |  |  |  |
|  |  |  |  |  | w/Alarm Contact | NRAS3121FS-78 |  |  |  |
| Relay Trip Voltage Trip | 1 | Tab Terminal | Without | Without | Without | NRAS1500-9 | - | - | 24 V DC |
|  | 2 |  |  |  | Without | NRAS2500-9 |  |  |  |
|  | 3 |  |  |  | Without | NRAS3500-9 |  |  |  |

## NRAN (Lever Type)

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- Specify a rated current, time delay curve, and rated voltage in place of 789. Package Quantity: 1


NRA Series Circuit Protectors

## NRAR (Rocker Type)

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- Specify a rated current, time delay curve, and indicator rated voltage in place of 7810 Package Quantity: 1


Internal Circuits
NRAS and NRAN onlinecomponents.com

| Series Trip (Current Trip) | Series Trip (Current Trip) <br> With Auxiliary Contact | Series Trip (Current Trip) With Alarm Contact | Relay Trip (Voltage Trip) |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |


| Flush |
| :--- |
| Silhouette |

NRAR • Dashed lines show the illuminated rocker type.

| Series Trip <br> (Current Trip) |
| :---: | | Series Trip |
| :---: |
| (Current Trip) |
| With Auxiliary Contact |$\quad$| 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 <br> (for AC) | 100 to 110V | White | White |
|  | 200 to 220V | Black | Black |
|  | Positive | Black | - |
|  | Negative | - | White |



Overcurrent - Time Delay Characteristics (sec at 25으)

| For | Time Delay Curve | Percent of Rated Current |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 100\% | 125\% | 150\% | 200\% | 400\% | 600\% | 800\% | 1000\% |
| $\begin{aligned} & \mathrm{AC} \\ & 50 / 60 \mathrm{~Hz} \end{aligned}$ | 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 |


| Terminal <br> Blocks |
| :--- |
| Comm. <br> Terminals |
| AS-Interface |
|  <br> Timers |

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

## Time Delay Curves

## For AC



For DC



Current (percent load of the rated current)
onlinecomponents.com



## 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 $25^{\circ} \mathrm{C}$. With reference to these curves, time delays can be corrected.

## Temperature Correction Curve

The above time delay curves are at $25^{\circ} \mathrm{C}$. 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.

Impedance and Coil Resistance

- Series Trip (Current Trip)

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

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

- Relay Trip (Voltage Trip) (at $25^{\circ} \mathrm{C}$ )

| Rated Voltage | For DC <br> Resistance $(\Omega)$ |
| :---: | :---: |
| $24 V$ DC | 163 |

Note: Tolerance: $\pm 25 \%$

- 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.



## Dimensions

NRAS (Lever Type)

## -1-pole Type



Tab terminal \#250

-2-pole Type

-3-pole Type


NRAS (Lever Type with Flush Plate)


NRAN (Lever Type)


NRAR (Rocker Type)


Mounting Hole Layout

| Type | NRAS on | monentSS.E06 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 plugin base is used. |

M3 screw mounting
Tightening torque: $0.5 \mathrm{~N} \cdot \mathrm{~m}$
Tightening strength: $1.1 \mathrm{~N} \cdot \mathrm{~m}$

- 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 | $\square$ | $(4)$ | $(4)$ | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 |
| With plain washer <br> (0.5 mm thick) | $\square$ | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | $(7)$ |
| With spring washer <br> (0.7 mm thick) | $\square$ | 5 | 5 | 5 | 5 | 6 | 6 | 6 | 6 | 6 | 7 |
| With plain washer <br> (0.5 mm thick) and <br> spring washer <br> $(0.7$ mm thick) | $\square$ | 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.


| 1. Applicable wire size | 1.25 to $5.5 \mathrm{~mm}^{2}$ |
| :--- | :--- |
| 2. Applicable crimping terminal | $\mathrm{R} 1.25-4$ to $\mathrm{R} 5.5-4$ |
| 3. No.of crimping terminal | 1 |
| 4. Tightening torque | 1.0 to $1.2 \mathrm{~N} \cdot \mathrm{~m}$ |
| 5. Tensile strength <br> (Static 1 minute) | Axial direction: 80 N <br> Transverse direction: 20 N |

Thrust force (screw pressing load) in screw tightening should be 29 No 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 50 N without deforming the terminal.

NRA Series Circuit Protectors
Accessories (Option)
Package Quantity: 1


| Appearance | Color | Type No. | Ordering Type No. | Package Quantity | For Use on | Description |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| - Color Cap$\stackrel{\leftrightarrow 15.8 \mathrm{~mm}}{ }$ 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: <br> Blue (7.5B4/8 approx.) <br> Red (7.5R5/14 approx.) <br> White (N9.5 approx.) <br> Yellow (2.5Y9/4 approx.) |
|  | Red | NR5R | NR5RPN05 |  |  |  |
|  | White | NR5H | NR5HPN05 |  |  |  |
|  | Yellow | NR5Y | NR5YPN05 |  |  |  |

## NRL series Circuit Protectors

## Miniature circuit protectors withallathpometis.dongetic tripping system, allow for space and cost savings. Long life also reduces maintenance costs.

- Compact size (only $36.6 \mathrm{H} \times 16.8 \mathrm{~W} \times 42 \mathrm{D} \mathrm{mm}$ )
- 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 <br> Mark | Certification Organization / <br> File No. |
| :--- | :---: | :--- |
| UL1077 |  | UL/c-UL File No. E68029 |
| CSA C22.2 No. 235 |  | No. LR83454 |
| EN60934 <br> (VDE0642) | NV: | No. 102746 |
| GB17701 | CCS | CCC No. 2005010307151789 |
| Electrical Appliance and <br> Material Safety Law <br> Technical Standard | PS <br> (For switch type) | (Electrical appliance except- <br> ing 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 <br> (Lever color: Black) | Lever Type (Lever color: Black) |  |  |  | Illuminated Rocker Type (Neon, LED) |  |
| Operator Style | Lever | Lever | Rocker | non-illuminated) | minated | ker | Large rocker (non-illuminated) |
| Protection Method | Hydraulic-magnetic tripping system |  |  |  |  |  |  |
| Internal Circuit | Series trip (Current trip), Relay trip (Voltage trip)* <br> 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 | 250 V AC 50/60Hz, 50 V DC |  |  |  |  |  |  |
| Minimum Applicable Load | 24 V 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) | 100 V AC $50 / 60 \mathrm{~Hz}, 24 \mathrm{~V} \mathrm{DC} \mathrm{(operating} \mathrm{at} 90 \%$ of the rated voltage or higher, at $25^{\circ} \mathrm{C}$ ) <br> Voltage application duration: 1 sec maximum <br> Trip time: 0.05 sec maximum (at the rated voltage) |  |  |  |  |  |  |
| Rated Interrupting Capacity | 250 V AC $50 / 60 \mathrm{~Hz}, 750 \mathrm{~A}$ PC1 (UL rating: 1000A) <br> 50 V DC, 500A PC1 (UL rating: 1000A) |  |  |  |  |  |  |
| Auxiliary Contact | SPDT microswitch125 V AC $\cdot 3 \mathrm{~A}$ (resistive load), $30 \mathrm{VDC} \cdot 2 \mathrm{~A}$ (resistive load) |  |  |  |  |  |  |
| Reference Temperature | $+25^{\circ} \mathrm{C}$ |  |  |  |  |  |  |
| Operating Temperature | -40 to $+60^{\circ} \mathrm{C}$ (no freezing) |  |  |  |  |  |  |
| Operating Humidity | 45 to 85\% RH (no condensation) |  |  |  |  |  |  |
| Insulation Resistance | $100 \mathrm{M} \Omega$ minimum ( 500 V DC megger) |  |  |  |  |  |  |
| Dielectric Strength | 2000V AC, 1 minute <br> (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 | $100 \mathrm{~m} / \mathrm{s}^{2}$ ( 10 to 55 Hz ), with the rated current applied |  |  |  |  |  |  |
| Shock Resistance | $500 \mathrm{~m} / \mathrm{s}^{2}$ (operating extremes and damage limits), with the rated current applied (auxiliary contact: $360 \mathrm{~m} / \mathrm{s}^{2}$ ) |  |  |  |  |  |  |
| Life | Electrical: Over 10,000 operations minimum (6 operations $/ \mathrm{min}$ )Mechanical: Over 20,000 operations minimum ( 6 operations $/ \mathrm{min}$ ) |  |  |  |  |  |  |
| Terminal Style (Note) | Main terminal: Tab terminal \#250 [NRLP: PCB terminal] Auxiliary contact terminal: Solder terminal [NRLP: PCB terminal] Indicator terminal [llluminated rocker type] : Tab terminal \#110 |  |  |  |  |  |  |
| Mounting Style | Ring mounting | PC board mounting | Snap-on | mounting | Screw m | unting | Screw mounting |
| Weight (Approx.) | $\begin{aligned} & \text { 1-pole: } 30 \mathrm{~g} \\ & \text { 2-pole: } 60 \mathrm{~g} \text { (NRLT series trip) } \end{aligned}$ |  |  |  |  |  |  |

- The ratings of switch only type are 250 V 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 125 V AC |
| LED | $6 \mathrm{~V}, 12 \mathrm{~V}, 24 \mathrm{~V}, 48 \mathrm{~V} \mathrm{AC/DC}$ <br>  |

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) <br> (NRLR) | Non-illuminated | Black, red, green | - |
|  | Neon | Transparent red | Red |
|  | LED | Transparent red | Red |
| Large Rocker (NRLK) |  | Black, Red |  |

## Type No. Development

## ontintecomponents.com



## NRLT (Lever Type)

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

Package Quantity: 1

| Internal | No. of | Inertia | Auxiliary Contact | Type No. | Design | on Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Circuit | Poles | Delay | xiliary Contact | (Ordering Type No.) | 6 Rated Current or Voltage | 7 Time Delay Curve |
| Series Trip Current Trip | 1 | Without | Without | NRLT1100-67 | $0.1 \mathrm{~A}, 0.5 \mathrm{~A}, 1 \mathrm{~A}, 2 \mathrm{~A}, 3 \mathrm{~A}, 4 \mathrm{~A}, 5 \mathrm{~A}$ 7.5A, 10A, 12.5A, 15A, 20A | AA, AD, BA, BD, EA, ED |
|  |  |  | With | NRLT1111-6] 7 |  |  |
|  |  | With | Without | NRLT1100F- 67 |  | AA, AD, BA, BD |
|  |  |  | With | NRLT1111F-6 7 |  |  |
|  | 2 | Without | Without | NRLT2100-6 7 |  | AA, AD, BA, BD, EA, ED |
|  |  |  | With | NRLT2111-67 |  |  |
|  |  | With | Without | NRLT2100F-667 |  | AA, AD, BA, BD |
|  |  |  | With | NRLT2111F-6 7 |  |  |
| Relay Trip Voltage Trip | 1 | Without | Without | NRLT1500-6 | 100 V AC 24 V DC | - |
|  | 2 |  | Without | NRLT2500-6 |  |  |
| Switch Only Type | 1 | Without | Without | NRLT1000 | - | - |
|  |  |  | With | NRLT1011 |  |  |
|  | 2 |  | Without | NRLT2000 |  |  |
|  |  |  | With | NRLT2011 |  |  |

NRL Series Circuit Protectors

## NRLY (Rocker Type)

[Snap-on Mounting Type]
onlinecomponents.con

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

|  |  |  |  |  |  |  | Designa | on Code |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Illumination | Internal Circuit | No. of Poles | Inertia Delay | Auxiliary Contact | Type No. <br> (Ordering Type No.) | 6 Rated Current and Voltage | 7 Time Delay Curve | 8 Indicator | 8 Rocker Color |
| Illuminated Type | Series Trip Current Trip | 1 | Without | Without | NRLY1100-67-7-8 | $\begin{aligned} & 0.1 \mathrm{~A} \\ & 0.5 \mathrm{~A} \\ & 1 \mathrm{~A} \\ & 2 \mathrm{~A} \\ & 3 \mathrm{~A} \\ & 4 \mathrm{~A} \\ & 5 \mathrm{~A} \\ & 7.5 \mathrm{~A} \\ & 10 \mathrm{~A} \\ & 12.5 \mathrm{~A} \\ & 15 \mathrm{~A} \\ & 20 \mathrm{~A} \end{aligned}$ | AA, AD, BA, BD, EA, ED | $\begin{aligned} & \text { 1: Neon } \\ & \text { 125V AC } \\ & 50 / 60 \mathrm{~Hz} \end{aligned}$ | - |
|  |  |  |  | With | NRLY1111-67-8 |  |  |  |  |
|  |  |  | With | Without | NRLY1100F-6 7-8 |  | AA, AD, BA, BD |  |  |
|  |  |  |  | With | NRLY1111F-6 7-8 |  |  |  |  |
|  |  | 2 | Without | Without | NRLY2100-677-8 |  | AA, AD, BA, BD, EA, ED |  |  |
|  |  |  |  | With | NRLY2111-6 7-8 |  |  |  |  |
|  |  |  | With | Without | NRLY2100F-677-8 |  | AA, AD, BA, BD | $\begin{aligned} & \text { 3: LED } \\ & \text { 6V AC/DC } \end{aligned}$ |  |
|  |  |  |  | With | NRLY2111F-6 7-8 |  |  |  |  |
|  | Relay Trip Voltage Trip | 1 | Without | Without | NRLY1500-6-8 | 100 V AC <br> 24V DC |  | $\begin{aligned} & \text { 4: LED } \\ & \text { 12V AC/DC } \end{aligned}$ |  |
|  |  | 2 |  | Without | NRLY2500-6-8 |  |  | $\begin{aligned} & \text { 7: LED } \\ & 48 \mathrm{~V} \text { AC/DC } \end{aligned}$ |  |
|  | Switch Only Type | 1 | Without | Without | NRLY1000-8 |  | - |  |  |
|  |  |  |  | With | NRLY1011-8 |  |  |  |  |
|  |  | 2 |  | Without | NRLY2000-8 |  |  |  |  |
|  |  |  |  | With | NRLY2011-8 |  |  |  |  |
| Nonilluminated Type | Series Trip Current Trip | 1 | Without | Without | NRLY1100-6] 7-8 | $\begin{gathered} 0.1 \mathrm{~A} \\ 0.5 \mathrm{~A} \\ 1 \mathrm{~A} \\ 2 \mathrm{~A} \\ 3 \mathrm{~A} \\ 4 \mathrm{~A} \\ 5 \mathrm{~A} \\ 7.5 \mathrm{~A} \\ 10 \mathrm{~A} \\ 12.5 \mathrm{~A} \\ 15 \mathrm{~A} \\ 20 \mathrm{~A} \end{gathered}$ | AA, AD, BA, BD, EA, ED |  | B, G, R |
|  |  |  |  | With | NRLY1111-6 7 - 8 |  |  |  |  |
|  |  |  | With | Without | NRLY1100F-6 7-8 |  | $\begin{aligned} & \mathrm{AA}, \mathrm{AD}, \mathrm{BA} \text {, } \\ & \mathrm{BD} \end{aligned}$ |  |  |
|  |  |  |  | With | NRLY1111F-67-8 |  |  |  |  |
|  |  | 2 | Without | Without | NRLY2100-6] 7-8 |  | AA, AD, BA, BD, EA, ED |  |  |
|  |  |  |  | With | NRLY2111-6 7-8 |  |  |  |  |
|  |  |  | With | Without | NRLY2100F-67-8 |  | $\begin{aligned} & A A, A D, B A \text {, } \\ & B D \end{aligned}$ |  |  |
|  |  |  |  | With | NRLY2111F-6 7-8 |  |  |  |  |
|  | Relay Trip Voltage Trip | 1 | Without | Without | NRLY1500-6-8 | 100 V AC <br> 24V DC |  |  |  |
|  |  | 2 |  | Without | NRLY2500-6-8 |  |  |  |  |
|  | Switch Only Type |  | Without | Without | NRLY1000-8 | - | - |  |  |
|  |  |  |  | With | NRLY1011-8 |  |  |  |  |
|  |  | 2 |  | Without | NRLY2000-8 |  |  |  |  |
|  |  |  |  | With | NRLY2011-8 |  |  |  |  |

## NRLR (Rocker Type)

[Screw Mounting Type]
onlinecomponents.com

- Specify a rated current or voltage, time delay cerivive, an ind indicartor or rocker color in place of 6 678 . Package Quantity: 1



## NRLK (Large Rocker Type)

[Snap-on Mounting Type]
ontinecomponents.com

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 | $\begin{aligned} & 0.1 \mathrm{~A} \\ & 0.5 \mathrm{~A} \\ & 1 \mathrm{~A} \\ & 2 \mathrm{~A} \\ & 3 \mathrm{~A} \\ & 4 \mathrm{~A} \\ & 5 \mathrm{~A} \\ & 7.5 \mathrm{~A} \\ & 10 \mathrm{~A} \\ & 12.5 \mathrm{~A} \\ & 15 \mathrm{~A} \\ & 20 \mathrm{~A} \end{aligned}$ | AA, AD, BA, BD, EA, ED | , G, R |
|  |  |  | With | NRLK1111-6 7-8 |  |  |  |
|  |  | With | Without | NRLK1100F-6-7-8 |  | AA, AD, BA, BD |  |
|  |  |  | With | NRLK1111F-67-8 |  |  |  |
|  | 2 | Without | Without | NRLK2100-6 7-8 |  | AA, AD, BA, BD, EA, ED |  |
|  |  |  | With | NRLK2111-67-7 8 |  |  |  |
|  |  | With | Without | NRLK2100F-67-8 |  | $\begin{aligned} & \mathrm{AA}, \mathrm{AD}, \mathrm{BA} \text {, } \\ & \mathrm{BD} \end{aligned}$ |  |
|  |  |  | With | NRLK2111F-67-8 |  |  |  |
| Relay Trip Voltage Trip | 1 | Without | Without | NRLK1500-6-8 | $\begin{aligned} & 100 \mathrm{~V} \text { AC } \\ & 24 \mathrm{~V} \text { DC } \end{aligned}$ |  |  |
|  | 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 67 .

| Internal Circuit | No. of Poles | Inertia Delay | Auxiliary Contact | Type No. <br> (Ordering Type No.) | Designation Code |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | 6 Rated Current | 7 Time Delay Curve |
| Series Trip Current Trip | 1 | Without | Without | NRLP1100-6 7 | $\begin{aligned} & 0.1 \mathrm{~A} \\ & 0.5 \mathrm{~A} \end{aligned}$ | AA, AD, BA, BD, EA, ED |
|  |  |  | With | NRLP1114-67 | $\begin{aligned} & 2 A \\ & 3 A \end{aligned}$ |  |
|  |  | With | Without | NRLP1100F-6 7 | $\begin{aligned} & 7.5 \mathrm{~A} \\ & 10 \mathrm{~A} \\ & 12.5 \mathrm{~A} \\ & 15 \mathrm{~A} \\ & 20 \mathrm{~A} \end{aligned}$ | $\begin{aligned} & \mathrm{AA}, \mathrm{AD}, \mathrm{BA}, \\ & \mathrm{BD} \end{aligned}$ |
|  |  |  | With | NRLP1114F-6 7 |  |  |
| Switch Only Type | 1 | Without | Without | NRLP1000 | - | - |
|  |  |  | With | NRLP1014 |  |  |

Internal Circuits


## Overcurrent - Time Delay Characteristics (sec at 25으)

| Time Delay Curves |  | Percent of Rated Current |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AC <br> $50 / 60 \mathrm{~Hz}$ | DC | $100 \%$ | $135 \%$ | $150 \%$ | $200 \%$ | $400 \%$ | $600 \%$ | $800 \%$ |
| $\mathrm{AA} \star$ | AD $\star$ | No Trip | $3-70$ | $2-40$ | $1-15$ | $0.1-4$ | $0.01-2$ | $0.007-0.8$ |
| $\mathrm{BA} \star$ | BD $\star$ | 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 $\star$ are also available with inertia delay. (Inertia delay is not available for Curves ED and EA)
Time Delay Curves Note: Curves marked with $\star$ are also available with inertia delay.

Current (percent load of the rated current)

Current (percent load of the rated current)

Current (percent load of the rated current)

## Circuit Protector with Inertia Delay

Inertia delay is designed not to trip on a non-renliteremponents:eom
 dition, 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 $25^{\circ} \mathrm{C}$. 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 25으)

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

Note: Tolerance: $\pm 25 \%$



## Relays \&

 Timers
## Sockets

## 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 $) \times 135 \% \times$ (Correction factor by installation angle)


## Dimensions

- NRLT (Lever Type) Note: The dashed lines anlinecomponentsacom

- 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.

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

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


Illuminated Rocker Type
(1-pole, with auxiliary contact) Series Trip, Switch Only Type
(without auxiliary contact) Series Trip, Switch Only Type

Indicator terminal: Tab \#110


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, with auxiliary contact)
Series Trip, Switch Only Type
Indicator terminal: Tab \#110


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


Lead wire length: Approx. 100 mm

## Mounting Hole Layout



NRL Series Circuit Protectors

## Accessories for NRLT (Lever Type) • Optional



Package Quantity: 1


## NRBM series Circuit Protectors

## Variety of rated currents: 1A dalinioumponents.com <br> 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. |
| :---: | :---: | :---: |
| $\begin{aligned} & \text { UL1077 } \\ & \text { CSA C22.2 No. } 235 \end{aligned}$ | c | UL/c-UL File No. E68029 |
| $\begin{aligned} & \text { EN60934 } \\ & \text { (VDE0642) } \end{aligned}$ | $\mathrm{V}_{\mathrm{E}}$ | No. 113434 |
| GB17701 | $C(s)$ | CCC No. 2005010307151788 |
| Electrical Appliance and Material Safety Law Technical Standard | PS | 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) <br> Series trip with auxiliary contacts <br> Series trip with alarm contacts |
| No. of poles | $1,2,3$ poles |
| Rated Voltage | 250 V AC 50/60 Hz, 65V DC |
| Minimum Applied Load | $24 \mathrm{~V} \mathrm{AC/DC,100} \mathrm{~mA} \mathrm{(reference} \mathrm{value)}$ |
| Rated Current | Current trip: $1 \mathrm{~A}, 2 \mathrm{~A}, 3 \mathrm{~A}, 5 \mathrm{~A}, 7.5 \mathrm{~A}, 10 \mathrm{~A}, 15 \mathrm{~A}, 20 \mathrm{~A}, 25 \mathrm{~A}, 30 \mathrm{~A}, 40 \mathrm{~A}, 50 \mathrm{~A}$ |
| Rated Interrupting Capacity | 250 V AC 50/60Hz, 65V DC, 1000A |
| Auxiliary Contact | SPDT microswitch <br> Alarm Contact <br> $250 \mathrm{~V} \mathrm{AC} \mathrm{5A}$ <br> 50 V DC 1A (resistive load) |
| Reference Temperature | $+25^{\circ} \mathrm{C}$ |
| Operating Temperature | -40 to +85 ${ }^{\circ} \mathrm{C}$ (no freezing) |
| Operating Humidity | 45 to $85 \%$ RH (no condensing) |
| Insulation Resistance | $100 \mathrm{M} \mathrm{\Omega}$ minimum (500V DC megger) |
| Dielectric Strength | $2000 \mathrm{~V} \mathrm{AC} \mathrm{for} \mathrm{1} \mathrm{minute} \mathrm{(between} \mathrm{live} \mathrm{part} \mathrm{and} \mathrm{ground} ,\mathrm{between} \mathrm{terminals} \mathrm{of} \mathrm{different} \mathrm{poles} between$, <br> terminals of the same poles when main contacts are open, between main circuit and auxiliary contact) |
| Vibration Resistance | $100 \mathrm{~m} / \mathrm{s}^{2}$ (10 to 55 Hz) |
| Shock Resistance | $1000 \mathrm{~m} / \mathrm{s}^{2}$ |
| Life | 10,000 operations minimum (6 operations per minute) |
| Terminal Style | Main terminal: M5 stud screw <br> Auxiliary contact and alarm contact: Tab terminal \#80 |
| Weight (Approx.) | 1 -pole: $100 \mathrm{~g}, 2$-pole: 200g, 3-pole: 300g |

## Circuit

 ProtectorsPower Supplies

PLCs \& SmartRelay

Operator Interfaces

Sensors

Control
Stations

Explosion Protection

References

NRBM Series Circuit Protectors

## Type No. Development

,3, or 4-pole tys, raing and in each pole. Simultaneous-throw and simultaneous-break (all levers interconnected) is standard.
onimecomponents.com


| 1 | 0 |
| :--- | :--- |




| 4 Auxiliary Contact / Alarm Contact |  |  |
| :--- | :--- | :---: |
| Without | (Code) <br> 00 |  |
| With auxiliary <br> contact | $\square$ | 11 |
| With alarm <br> contact | $\square$ | 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 |  |
| :--- | :---: |
| Without | (Code) <br> Blank |
| With | F |



| 7 Time Delay Curve |  |
| :---: | :---: |
|  | Time Delay <br> Curve |
| AC type <br> $[50 / 60 \mathrm{~Hz}]$ | AA |
|  | BA |
| DC type | MA |
|  | AD |
|  | MD |

## NRBM (Lever Type)

- Specify a rated current and time delay curve in place of 67 .

Package Quantity: 1

| Internal Circuit | No. of Poles | Inertia Delay | Auxiliary Contact Alarm Contact | Type No. <br> (Ordering Type No.) | Code for Ordering |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | 6 Rated Current | 7 Time Delay Curve |
| Series Trip Current Trip |  | Without | Without | NRBM1100-6 7 | 1A <br> 2A <br> 3A <br> 5A <br> 7.5A <br> 10A <br> 15A <br> 20A <br> 25A <br> 30A <br> 40A <br> 50A | AA <br> BA <br> MA <br> AD <br> MD |
|  |  |  | w/Auxiliary Contact | NRBM1111-67 |  |  |
|  |  |  | 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 | NRBM2111-67 |  |  |
|  |  |  | 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 | NRBM3111-67 |  |  |
|  |  |  | w/Alarm Contact | NRBM3121-6 7 |  |  |
|  |  | With | Without | NRBM3100F- 67 |  |  |
|  |  |  | w/Auxiliary Contact | NRBM3111F- 67 |  |  |
|  |  |  | w/Alarm Contact | NRBM3121F-6 7 |  |  |

Internal Circuits


## Mounting Hole Layout



## Circuit Protector with Inertia Delay

Circuit protectors equipped with inertia delay do nonlarecomponiehts.com inrush currents caused by transformer or lamp loadse, batrperformmwen 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 25으)

| Rated <br> Current $(\mathrm{A})$ | For AC 50/60Hz <br> Impedance $(\Omega)$ | For DC <br> Resistance $(\Omega)$ |
| :---: | :---: | :---: |
|  | 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: $\pm 25 \%$ (up to 20 A ), $\pm 50 \%$ (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 $25^{\circ} \mathrm{C}$. 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 ${ }_{\text {¢ }}$ | (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: $0.5 \mathrm{~N} \cdot \mathrm{~m}$ minimum
Tightening strength: $1.1 \mathrm{~N} \cdot \mathrm{~m}$ maximum

## - Installation Angle

Designed to be mounted on a vertical surface in principle, the circuit protector must be mounted on a surface within $10^{\circ}$ 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.

## NRC series Circuit Protectors

## Small and high-performance qinmetinmantantons with rated interrupting capacity 2500A (2-pole type: 1500A) [ Molded case circuit breaker] <br> 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 <br> Mark | Certification Organization / <br> File No. |
| :--- | :---: | :--- |
| UL1077 | UL File No. E68029 |  |
| CSA C22.2 No. 235 | NE | No. LR83454 |
| Electrical Appliance and <br> Material safety <br> Law Technical Standard | JET |  |

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

## Specifications




## 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 <br> 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

| 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. $\quad$ 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, $0.5 \mathrm{~A}, 1 \mathrm{~A}, 2 \mathrm{~A}, 3 \mathrm{~A}, 5 \mathrm{~A}, 7.5 \mathrm{~A}, 10 \mathrm{~A}, 15 \mathrm{~A}, 20 \mathrm{~A}, 30 \mathrm{~A}$ |
|  |  | 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

| 团Type No. | 22 Rated Current 3 Time Delay Curve |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | $\square$ | - |  | . |
| NRC110 | Sliding knob operator (w/o auxiliary contact) 1-pole | $0.3 \mathrm{~A}, 0.5 \mathrm{~A}, 1 \mathrm{~A}, 2 \mathrm{~A}, 3 \mathrm{~A}, 5 \mathrm{~A}, 7 \mathrm{~A}$, 10A, 15A, 20A, 30A | AA | Slow delay type for AC |
| NRC111 | Sliding knob operator (w/auxiliary contact) 1-pole |  | EA | Fast delay type for AC |
| NRC110L | Lever operator (w/o auxiliary contact) 1-pole |  | AD | Slow delay type for DC |
| NRC111L | Lever operator (w/auxiliary contact) 1-pole |  | 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

Flush
Silhouette

## Control

 UnitsDisplay Lights

Display Units

Safety Products

Terminal
Blocks

Comm.
Terminals

AS-Interface

Relays \&
Timers

Sockets

Circuit
Protectors

Power
Supplies

PLCs \&
SmartRelay

Operator
Interfaces

Sensors

Control
Stations

Explosion
Protection

References

NRC Series Circuit Protectors
Dimensions and Mounting Hole Layout (1-pole Type)

| Type | Type No. | onlinPcommponents.com | Mounting Hole Layout |
| :---: | :---: | :---: | :---: |
| Sliding Knob | NRC110 <br> (Without Auxiliary Contact) |  | > $\theta^{\circ}$ |
| Operator <br> (1-pole) | NRC111 <br> (With Auxiliary Contact) |  | - Mounting Hole Layout |
| Lever Operator (1-pole) | NRC110L <br> (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. |
|  | NRC111L (With Auxiliary Contact) |  |  |

Dimensions and Mounting Hole Layout (2-pole Type)

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

Overcurrent - Time Delay Characteristics (sec at $40{ }^{\circ} \mathrm{C}$ )

| Type | Time Delay Curve | OIIIIIIECOMIIDOIEIIS.COIII 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



Coil Resistance and Impedance (at $40^{\circ} \mathrm{C}$ ) 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 $40^{\circ} \mathrm{C}$. 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.


For solenoid protection such as the above example, NRC circuit protector for the rated current 1 A 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 $10^{\circ}$ 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.

## Wiring Example



## NRF series Circuit Protectors

## Snaps into a 16-mm-diameter hanlecomponents.com 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 <br> Mark | Certification Organization / <br> File No. |
| :--- | :---: | :--- |
| UL1077 | CSA C22.2 No. 235 (Note 1) | SA | No. LR83454 | ENile No. E68029 |
| :--- |
| EN60934 (Note 2) |
| GB17701 |



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 12.

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 | $\begin{array}{l}\text { Bezel } \\ \text { Color }\end{array}$ Code |  |
|  |  |  | NRF110 2-1 | UL CSA TÜV (Note) | 1A, 2A, 3A, 5A, 8A, 10A, 15A |  |  |
|  |  | With | NRF210 2-1 | UL | 0.3A, 0.5A | Black | Blank |
|  |  |  | NRF210 2-1 | UL | 1A, 2A, 3A, 5A, 8A, 10A, 15A | Green | G |
| w/Auxiliary Contact |  | Without | NRF111 2-1 | UL CSA | $0.3 \mathrm{~A}, 0.5 \mathrm{~A}, 1 \mathrm{~A}, 2 \mathrm{~A}, 3 \mathrm{~A}, 5 \mathrm{~A}$, 8A, 10A, 15A | Blue | S |
|  |  |  |  |  |  | White | W |
|  |  | With | NRF211 2-1 | UL CSA |  | Yellow | Y |

Note: TÜV approved models are for $8 \mathrm{~A}, 10 \mathrm{~A}$, and 15 A 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]


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

Note 1: The rated current is the value at the reference ambient tempera ture of $25^{\circ} \mathrm{C}$, 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 $25^{\circ} \mathrm{C}$.

## Applications

tS.cothF 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



Note: Dashed lines are reference values.

Rated Current vs Internal Resistance


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 $25^{\circ} \mathrm{C}$. 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.


- Surface Mount Adapter

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




## 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 anfinesomponents．com

－SIL type subminiature circuit protectors adopting IC termi－ nal arrangements，and mountable directly on PC boards
－Simple construction and high performance applying a pos－ itive load reversing mechanism by IDEC＇s original design
－Unlike fuses，the thermal trip mode（bimetal type）elimi－ nates erroneous interruption due to inrush currents．
－Rated current can be selected to meet the load．Circuits with high inrush currents can be protected against over－ loads（unlike fuses）．
－Reusable 200 operations（tripping at $200 \%$ the rated cur－ rent）with higher economic efficiency，and less mainte－ nance 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．＂


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

## Types

－Specify a rated current in place of $\square$

|  | pe | Appearance | Type No． | Ordering Type No． | $\square$ Rated Current | Contact | Internal Circuit （Note） | Package Quantity |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NRPS <br> （Slim Type） | Non－sealed |  | NRPS10－प | NRPS10－ロPN10 | $\begin{aligned} & 1 \mathrm{~A}, 1.6 \mathrm{~A}, 2 \mathrm{~A} \\ & 3.15 \mathrm{~A}, 4 \mathrm{~A}, 5 \mathrm{~A}, 6 \mathrm{~A} \end{aligned}$ | 1NC |  | 10 |
|  | Sealed （Tape－sealed） |  | NRPS10－G］ | NRPS10－GDPN10 | 1A，1．6A，2A， 3．15A，4A，5A，6A | 1NC |  | 10 |
| NRPF <br> （Flat Type） | Non－sealed |  | NRPF10－■ | NRPF10－ロPN10 | 1A，1．6A，2A， <br> 3．15A，4A，5A，6A | 1NC |  | 10 |
|  | Sealed （Tape－sealed） |  | NRPF10－G口 | NRPF10－GDPN10 | $\begin{aligned} & \text { 1A, 1.6A, 2A, } \\ & 3.15 A, 4 A, 5 A, 6 A \end{aligned}$ | 1NC |  | 10 |
| NRPS （Slim Type） | Non－sealed |  | NRPS11－■ | NRPS11－םPN10 | 1A，1．6A，2A， 3．15A，4A，5A，6A | SPDT |  | 10 |
|  | Sealed （Tape－sealed） |  | NRPS11－G口 | NRPS11－GDPN10 | 1A，1．6A，2A， 3．15A，4A，5A，6A | SPDT |  | 10 |
| NRPF <br> （Flat Type） | Non－sealed |  | NRPF11－■ | NRPF11－पPN10 | $\begin{aligned} & 1 \mathrm{~A}, 1.6 \mathrm{~A}, 2 \mathrm{~A} \\ & 3.15 \mathrm{~A}, 4 \mathrm{~A}, 5 \mathrm{~A}, 6 \mathrm{~A} \end{aligned}$ | SPDT |  | 10 |
|  | Sealed （Tape－sealed） |  | NRPF11－G口 | NRPF11－GDPN10 | $\begin{aligned} & 1 \mathrm{~A}, 1.6 \mathrm{~A}, 2 \mathrm{~A} \\ & 3.15 \mathrm{~A}, 4 \mathrm{~A}, 5 \mathrm{~A}, 6 \mathrm{~A} \end{aligned}$ | 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．

## NRP Series PC Board Circuit Protectors

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

| Applications | onlinetominoments.com |  | Flat Type |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Non-sealed ${ }^{\text {THE OMNE OsTr }}$ | mowsealed | Non-sealed | Sealed |
|  | NRPS10- <br> NRPS11- | NRPS10-G $\square$ NRPS11-G | NRPF10- <br> NRPF11- | NRPF10-G $\square$ 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 | 250 V AC ( $50 / 60 \mathrm{~Hz}$ ), 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 | $25^{\circ} \mathrm{C}$ |
| Operating Temperature (Note) | -10 to $+50^{\circ} \mathrm{C}$ (no freezing) |
| Operating Humidity | 45 to 85\% RH (no condensation) |
| Storage Ambient Temperature | $-30^{\circ} \mathrm{C}$ to $+70^{\circ} \mathrm{C}$ (no freezing) |
| Storage Ambient Humidity | 45 to 85\% RH (no condensation) |
| Vibration Resistance | $100 \mathrm{~m} / \mathrm{sec}^{2}$ ( 10 to 55 Hz ) |
| Shock Resistance | Damage limits: $1000 \mathrm{~m} / \mathrm{s}^{2}$ <br> Operating extremes: $500 \mathrm{~m} / \mathrm{s}^{2}$ |
| Life | 200 operations (tripping at 200\% the rated current) |
| Insulation Resistance | $100 \mathrm{M} \Omega$ minimum (500V DC megger) |
| Dielectric Strength | 1500 V AC $(50 / 60 \mathrm{~Hz})$, 1 minute (between terminals of the same pole when main contacts are open, and between live parts and ground) |
| Initial contact | Between terminals(1) and (2): <br> $200 \mathrm{~m} \Omega$ maximum (5V DC •1A) <br> Between terminals(2) and (3): <br> $100 \mathrm{~m} \Omega$ maximum (5V DC $\cdot 100 \mathrm{~mA}$ ) |
| Weight (Approx.) | 2 g |

Note: The rated current is the value at the reference ambient temperature of $25^{\circ} \mathrm{C}$, 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 $25^{\circ} \mathrm{C}$. 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

onlinecomponents.comiat Type


- Dielectric Strength Test • Short-circuit Test (AC)


- Short-circuit Test (DC)

| Item | 1500V AC <br> 1 minute | Critical Values |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | MIN | MAX |  |
| Between terminals <br> (Open) <br> (1) - (2) \& (3) | Normal | 2800 | 1700 | 3400 |
| Between terminals <br> (Open) <br> (2) - (3) \& (1) | Normal | 2740 | 2700 | 3400 |
| Between housing and <br> terminal <br> (4) - (1) \& (2) \& (3) | Normal | 3600 | 3300 | 3800 |



Frequency: 60 Hz

- Short-circuit current (effective value)

20A

- Power factor: $\cos \varnothing=1$ (4 cycles after power is applied)


Data

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



## 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:
Communication Equipment:
Commu
Power Supplies:
Testers, Oscilloscopes, etc.
Transmitter/Receiver, Telephone
Exchanger
Switching Power Supplies, Small Generators

## Application Circuits Example



## 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.: $350^{\circ} \mathrm{C}$ ) quickly with in 3 seconds. (When lead-free soldering is used, Sn -$\mathrm{Ag}-\mathrm{Cu}$ 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: $260^{\circ} \mathrm{C}$
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 $60^{\circ} \mathrm{C}$ maximum within 30 seconds (and 50 mm 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 $70^{\circ} \mathrm{C}$. If storage temperature exceeds $70^{\circ} \mathrm{C}$, 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 $25^{\circ} \mathrm{C}$ ). 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.

