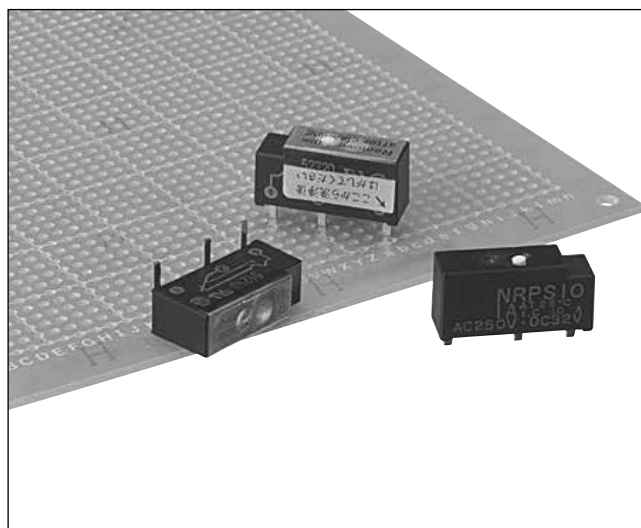


# NRP Series PC Board Circuit Protectors

## Higher economic efficiency than a fuse

- SIL subminiature circuit protectors adopting IC terminal arrangements, and mountable directly on PC boards
- Simple construction and high performance.
- Unlike fuses, the thermal trip mode (bimetal) 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 styles. Slims (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	Mark	Certification Organization / File No.
UL1077		UL recognized File No. E68029
CSA C22.2 No. 235		CSA file No. LR65560

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

Specify a rated current in place of □.

Style	Shape	Part No.	Ordering No.	□ Rated Current	Contact	Internal Circuit (Note)	Package Quantity
NRPS (Slim)	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)	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)	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)	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.

# NRP Series Circuit Protectors

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

Applications	Slim		Flat	
	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.

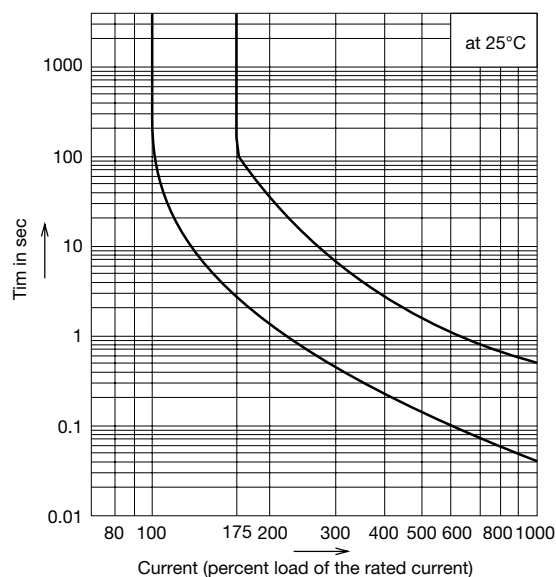
When using flux, use rosin flux. Select the sealed type irrespective of cleaning necessity.

## 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 Current	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°C
Operating Temperature (Note)	-10 to +50°C (no freezing)
Storage Temperature	-30 to +70°C (no freezing)
Operating Humidity	45 to 85% RH (no condensation)
Storage Ambient Humidity	45 to 85% RH (no condensation)
Vibration Resistance	100 m/sec <sup>2</sup> (10 to 55 Hz)
Shock Resistance	Damage limits: 1000 m/s <sup>2</sup> Operating extremes: 500 m/s <sup>2</sup>
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 terminals ① and ②: 200 mΩ maximum (5V DC · 1A) Between terminals ② and ③: 100 mΩ maximum (5V DC · 100mA)
Weight (Approx.)	2g

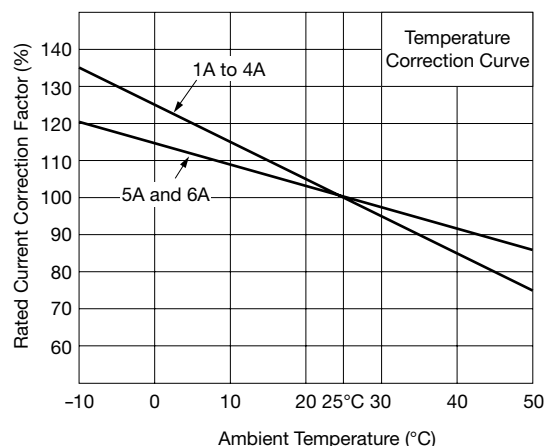
Note: The rated current is the value at the reference ambient temperature of 25°C, and varies with operating temperature. The rated current can be corrected according to the Temperature Correction Curve.

## Time Delay Curves



## Temperature Correction Curve

The rated current is based on an ambient temperature of 25°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.

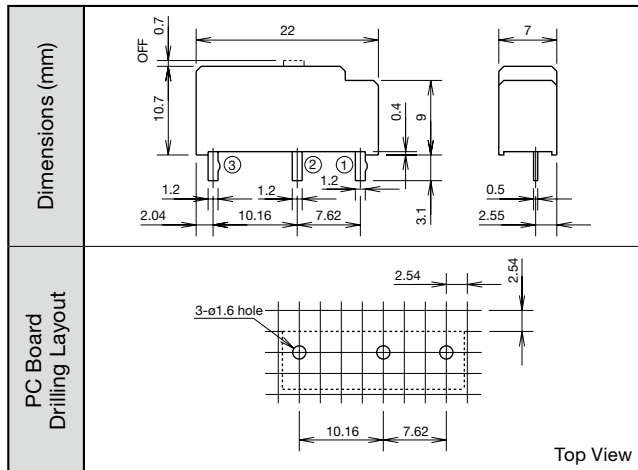


## Overcurrent - Time Delay Characteristics (sec at 25°C)

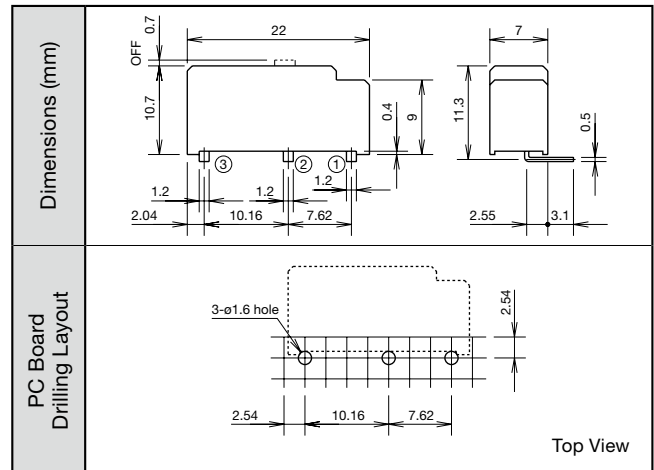
Percent of Rated Current	100%	175%	200%	400%	600%	800%	1000%
Time Delay	No Trip	2.2-120	1.2-40	0.24-2.2	0.1-1	0.06-0.7	0.04-0.5

## Dimensions and PC Board Drilling Layout

### Slim



### Flat



## 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.

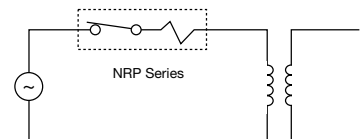
### Applications Examples

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

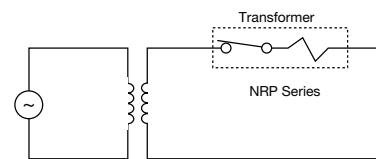
## Application Circuits Example

### Transformer Protection Example

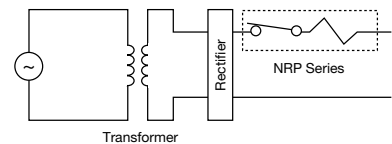
Transformer Primary Protection



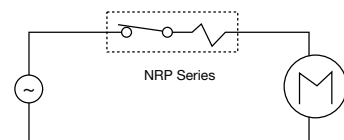
Transformer Secondary Protection



### Rectifier Protection Example



### Motor Coil Protection



# NRP Series Circuit Protectors

## Safety Precautions

### 1. Soldering

#### 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°C) quickly within 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: 260°C

Dipping duration: 5 seconds maximum

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

### 2. Washing

- When there is a possibility of washing, select the seal type.
- Washing should be done at 60°C 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.
- 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.
- Color fading may occur when the taping is removed.

### 3. Notes for Bimetal

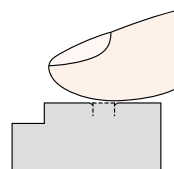
- Storage temperature should not exceed 70°C. If storage temperature exceeds 70°C, the bimetal may trip.
- Applied current should be under the rated current for the normal use. The rated current should be corrected according to the ambient temperature chart due to bimetal characteristics.
- Since the NRPS and NRPF are designed for protection against overloads, they should be used within the rated interrupting current. An excessive overcurrent may affect the bimetal characteristics or damage the internal mechanism.
- 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 actuator (white pin) at the top of the unit with tweezers.

### 5. Other Notes

- 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).
- Turn power off and allow at least 60 seconds before re-throwing (at reference ambient temperature of 25°C). Reset the protector with no load. To re-throw, push the protruding actuator with a finger until it is the same surface height as the main body. If the actuator is pushed in with a sharp object, the inside of the actuator may be damaged.



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

# Ordering Terms and Conditions

Thank you for using IDEC Products.

By purchasing products listed in our catalogs, datasheets, and the like (hereinafter referred to as "Catalogs") you agree to be bound by these terms and conditions. Please read and agree to the terms and conditions before placing your order.

## 1. Notes on contents of Catalogs

- (1) Rated values, performance values, and specification values of IDEC products listed in this Catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.  
Also, durability varies depending on the usage environment and usage conditions.
- (2) Reference data and reference values listed in Catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.
- (3) The specifications / appearance and accessories of IDEC products listed in Catalogs are subject to change or termination of sales without notice, for improvement or other reasons.
- (4) The content of Catalogs is subject to change without notice.

## 2. Note on applications

- (1) If using IDEC products in combination with other products, confirm the applicable laws / regulations and standards.  
Also, confirm that IDEC products are compatible with your systems, machines, devices, and the like by using under the actual conditions. IDEC shall bear no liability whatsoever regarding the compatibility with IDEC products.
- (2) The usage examples and application examples listed in Catalogs are for reference purposes only. Therefore, when introducing a product, confirm the performance and safety of the instruments, devices, and the like before use. Furthermore, regarding these examples, IDEC does not grant license to use IDEC products to you, and IDEC offers no warranties regarding the ownership of intellectual property rights or non-infringement upon the intellectual property rights of third parties.
- (3) When using IDEC products, be cautious when implementing the following.
  - i. Use of IDEC products with sufficient allowance for rating and performance
  - ii. Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that an IDEC product fails
  - iii. Wiring and installation that ensures the IDEC product used in your system, machine, device, or the like can perform and function according to its specifications
- (4) Continuing to use an IDEC product even after the performance has deteriorated can result in abnormal heat, smoke, fires, and the like due to insulation deterioration or the like. Perform periodic maintenance for IDEC products and the systems, machines, devices, and the like in which they are used.
- (5) IDEC products are developed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use an IDEC product for these applications, unless otherwise agreed upon between you and IDEC, IDEC shall provide no guarantees whatsoever regarding IDEC products.
  - i. Use in applications that require a high degree of safety, including nuclear power control equipment, transportation equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.), equipment for use in outer space, elevating equipment, medical instruments, safety devices, or any other equipment, instruments, or the like that could endanger life or human health
  - ii. Use in applications that require a high degree of reliability, such as provision systems for gas / waterworks / electricity, etc., systems that operate continuously for 24 hours, and settlement systems
  - iii. Use in applications where the product may be handled or used deviating from the specifications or conditions / environment listed in the Catalogs, such as equipment used outdoors or applications in environments subject to chemical pollution or electromagnetic interference  
If you would like to use IDEC products in the above applications, be sure to consult with an IDEC sales representative.

## 3. Inspections

We ask that you implement inspections for IDEC products you purchase without delay, as well as thoroughly keep in mind management/maintenance regarding handling of the product before and during the inspection.

## 4. Warranty

### (1) Warranty period

The warranty period for IDEC products shall be one (1) year after purchase or delivery to the specified location. However, this shall not apply in cases where there is a different specification in the Catalogs or there is another agreement in place between you and IDEC.

### (2) Warranty scope

Should a failure occur in an IDEC product during the above warranty period for reasons attributable to IDEC, then IDEC shall replace or repair that product, free of charge, at the purchase location / delivery location of the product, or an IDEC service base. However, failures caused by the following reasons shall be deemed outside the scope of this warranty.

- i. The product was handled or used deviating from the conditions / environment listed in the Catalogs
- ii. The failure was caused by reasons other than an IDEC product
- iii. Modification or repair was performed by a party other than IDEC
- iv. The failure was caused by a software program of a party other than IDEC
- v. The product was used outside of its original purpose
- vi. Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and Catalogs
- vii. The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from IDEC
- viii. The failure was due to other causes not attributable to IDEC (including cases of force majeure such as natural disasters and other disasters)

Furthermore, the warranty described here refers to a warranty on the IDEC product as a unit, and damages induced by the failure of an IDEC product are excluded from this warranty.

## 5. Limitation of liability

The warranty listed in this Agreement is the full and complete warranty for IDEC products, and IDEC shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to an IDEC product.

## 6. Service scope

The prices of IDEC products do not include the cost of services, such as dispatching technicians. Therefore, separate fees are required in the following cases.

- (1) Instructions for installation / adjustment and accompaniment at test operation (including creating application software and testing operation, etc.)
- (2) Maintenance inspections, adjustments, and repairs
- (3) Technical instructions and technical training
- (4) Product tests or inspections specified by you

The above content assumes transactions and usage within your region. Please consult with an IDEC sales representative regarding transactions and usage outside of your region. Also, IDEC provides no guarantees whatsoever regarding IDEC products sold outside your region.

# IDEC CORPORATION

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