

NRF Series Circuit Protectors

Snap into a 16-mm-diameter hole

Wide variety of applications such as office automation equipment

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



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

Applicable Standards	Mark	Certification Organization / File No.
UL1077		UL recognized File No. E68029
CSA C22.2 No. 235		CSA file No. LR83454
EN60934		TÜV SÜD
GB17701		CCC No. 2005010309151798

See website for details on approvals and standards.

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

Package Quantity: 1

Auxiliary Contact	Internal Circuit	Manual OFF Mechanism	Part No.	Standard (*1)	Designation Code															
					[1] Rated Current	[2] Bezel Color														
w/o Auxiliary Contact		Without	NRF110 [2]-[1]	UL CSA CCC TÜV	0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A	<table border="1"> <thead> <tr> <th>Bezel Color</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>Black</td> <td>Blank</td> </tr> <tr> <td>Green</td> <td>G</td> </tr> <tr> <td>Red</td> <td>R</td> </tr> <tr> <td>Blue</td> <td>S</td> </tr> <tr> <td>White</td> <td>W</td> </tr> <tr> <td>Yellow</td> <td>Y</td> </tr> </tbody> </table>	Bezel Color	Code	Black	Blank	Green	G	Red	R	Blue	S	White	W	Yellow	Y
		Bezel Color	Code																	
Black	Blank																			
Green	G																			
Red	R																			
Blue	S																			
White	W																			
Yellow	Y																			
With	NRF210 [2]-[1]	UL CCC TÜV																		
w/Auxiliary Contact		Without	NRF111 [2]-[1]	UL CSA CCC TÜV																
		With	NRF211 [2]-[1]	UL CCC TÜV																

*1) When ordering the TÜV approved models, specify "-EN" at the end of the Part No.

Part No. Development

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

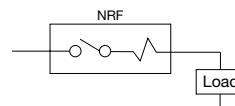
[Example]

NRF 2 11 R - 3A

Model	2	[1] Rated Current	3A
Manual OFF Mechanism	11	0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A	
		[2] Bezel Color	R
Auxiliary Contact			
Without	10		
With	11		

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

Wiring Example



Manual OFF Mechanism

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

Specifications

Protection Method	Thermal tripping
Internal Circuit	Series trip Series trip (w/auxiliary contact)
No. of Poles	1 pole
Rated Voltage	250V AC 50/60Hz, 32V DC
Rated Current	0.3A, 0.5A, 1A, 2A, 3A, 5A, 8A, 10A, 15A
Minimum Applicable Load	24V AC/DC 100mA (reference value)
Rated Interrupting Current (*1)	0.3A to 5A: Rated current x 6 8, 10, and 15A: Rated current x 10 (Turns on when the main circuit is off, including tripping.)
Maximum Interrupting Current	250V AC 50/60H: 1000A PC1, 32V DC: 1000A PC1
Auxiliary Contact Rating	1NO (contact output) 125V AC / 32V DC, 50mA
Reference Temperature	25°C
Operating Temperature (*2)	-10 to +60°C (no freezing)
Storage Temperature	-30 to +80°C (no freezing)
Operating Humidity	45 to 85% RH (no condensation)
Storage Humidity	45 to 85% RH (no condensation)
Trip Time (at 25°C)	No trip at the rated current Within 1 hour at 135% the rated current
Reset Time (*3)	60 sec minimum
Vibration Resistance	100 m/s ² (10 to 55 Hz)
Shock Resistance	Damage limits: 1000 m/s ² , Operating extremes: 500 m/s ²
Life	Overcurrent durability: 1,000 operations minimum (tripping at 200% the rated current) Mechanical life (with manual OFF mechanism): 240 operations minimum (switching at no load)
Insulation Resistance	100 MΩ minimum (500V DC megger)
Dielectric Strength	Between main contacts and between main contact and ground: 2000V AC, 1 minute Between main and auxiliary contacts: 1500V AC, 1 minute
Terminal Style	Main terminal: Tab terminal #250 Auxiliary contact terminal: 1.4W x 0.2mm thick solder terminal
Degree of Protection	IP40 (IEC 60529)
Weight (Approx.)	15g

*1) The rated interrupting current for TÜV certified products is AC: rated current x 6 times, DC: rated current x 4 times.

*2) The rated current is the value at the reference ambient temperature of 25°C, and varies with the operating temperature. The rated current can be corrected according to the temperature correction curve.

*3) Reset time is the value at the reference ambient temperature of 25°C.

Applications

NRF series circuit protectors are small, high-performance over-current 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

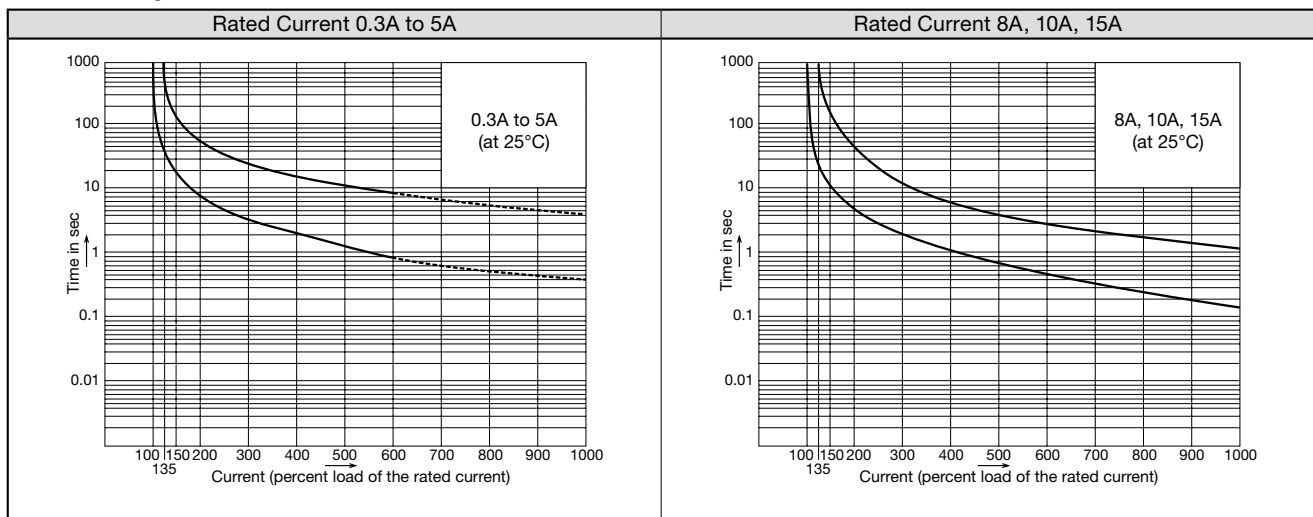
Business machines

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.

Overcurrent Trip Time

0.3A to 5A

(Ambient temperature + 25°C)

Percent of Rated Current	100%	135%	150%	200%	400%	600%
Trip Time (sec)	NO TRIP	30 to 3600	16 to 120	7 to 55 (*4)	2 to 17	0.9 to 8.5

8 to 15A

(Ambient temperature + 25°C)

Percent of Rated Current	100%	135%	150%	200%	400%	600%	800%	1000%
Trip Time (sec)	NO TRIP	28 to 3600	10 to 130	5 to 50 (*5)	1 to 7	0.45 to 3	0.25 to 1.8	0.15 to 1.2

*4) TÜV certified products are 7 to 180 seconds. (according to TÜV test circuits)

*5) TÜV certified products are 5 to 180 seconds. (according to TÜV test circuits)

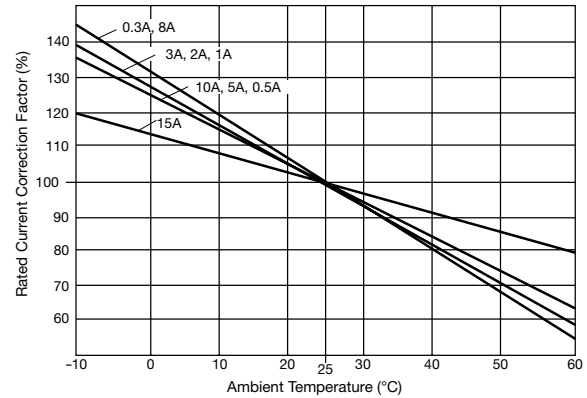
Rated Current vs Internal Resistance

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

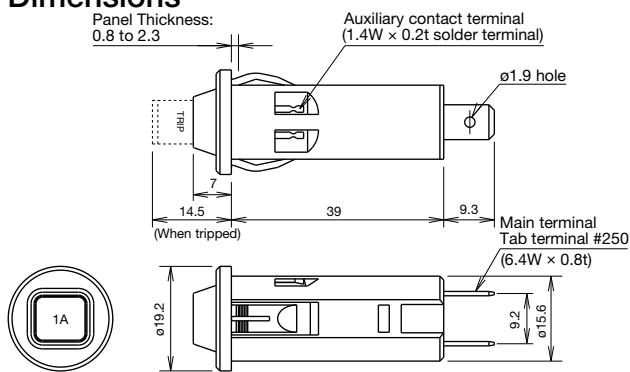
The internal resistance tends to be larger for smaller rated currents. When the circuit protector is used in a low-voltage circuit, voltage drop should be taken into consideration.

Temperature Correction Curve

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

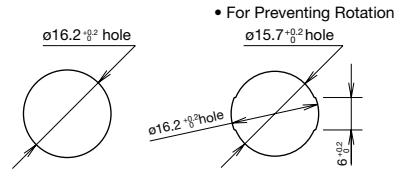


Dimensions



All dimension in mm.

Mounting Hole

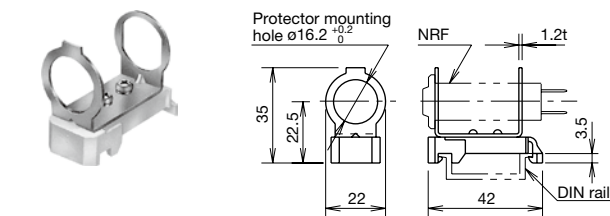


* Chamfering on the front edge of the mounting hole is recommended for easy insertion.

Accessories

35-mm-wide DIN Rail Mount Adapter

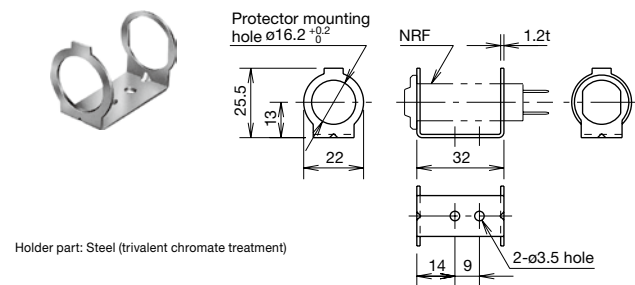
Part No.	Ordering No.	Package Quantity
NRF-D	NRF-DPN05	5



All dimension in mm.

Surface Mount Adapter

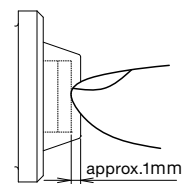
Part No.	Ordering No.	Package Quantity
NRF-M	NRF-MPN10	10



Instructions

- Since the NRF is designed for protection against overload, it should be used within the rated interrupting current. An excessive overcurrent may affect the bimetal characteristics or damage the internal mechanism.
- 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.
- The NRF may not trip at an instantaneous overcurrent due to its principle.
- 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.

- When installing quick connect receptacles to the terminals, hold the NRF body and press it into the quick connect receptacles.
- 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.)
- The models with manual OFF mechanism should be operated without load.
- For reset operation, push the button part in securely with one stroke until it is about 1 mm deeper than the flange. If not operated correctly, the unit may trip at less than the rated current or otherwise fail to operate properly.



Recommended Soldering Conditions

Solder the main terminal at a temperature of 390°C within 10 seconds using a 60W soldering iron. Solder the auxiliary/alarm terminal at a temperature of 350°C within 3 seconds using a 60W soldering iron. (Sn-Ag-Cu lead-free solder is recommended.) When soldering, do

not touch the circuit protector housing, auxiliary and alarm contacts with the soldering iron, and do not bend the terminals or pull the wires. Check your actual soldering conditions before soldering.

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.

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