

*Section*




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## Selection Guide

### Selection Guide: NRA Series



Series Model	NRAS	NRAN	NRAR
Page	N-4	N-4	N-4
Appearance			
Actuator Style	Lever	Lever	Rocker (non-illuminated and illuminated)
Number of Poles	1, 2, 3	1, 2, 3	1
Protection Method	Electromagnetic trip		
Internal Circuits	Series current trip		
Auxiliary Contact	Optional (250V AC, 5A; 50V DC, 1A)		
Alarm Contact	Optional (250V AC, 5A; 50V DC, 1A)		
Inertia Delay	Optional (for resistance to high in rushes)		
Time Delay Curves	2 types for DC; 3 types for AC		
Rated Voltage	250V AC, 50/60Hz, 65V DC		
Rated Tripping Currents	0.30A, 0.50A, 0.75A 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A		
Rated Interruption Capacity	1,000A, 250V AC, 50/60Hz, 65V DC		
Approvals	UL, CSA		UL



1. For dimensions, see page N-25.
2. NRAR is not CSA certified.
3. UL recognized, applicable standard: UL1077, "Supplementary Protectors."
4. Not suitable for branch circuit protection.

## Selection Guide, continued

### Selection Guide: NRBM and NRC Series

Series Model	NRBM	NRC
Page	N-12	N-19
Appearance		
Actuator Style	Lever	Slide, lever
Protection Method	Electromagnetic trip	
Number of Poles	1, 2, 3	1, 2
Internal Circuits	Series current trip	Series current trip
Auxiliary Contact	Optional (250V AC, 5A; 50V DC, 1A)	
Alarm Contact	Optional (250V AC, 5A; 50V DC, 1A)	
Inertia Delay	Optional (for resistance to high inrushes)	—
Time Delay Curves	2 types for DC; 3 types for AC	2 types for DC; 2 types for AC
Rated Voltage	250V AC, 50/60Hz, 65V DC	
Rated Tripping Currents	1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A	0.30A, 0.5A, 0.75A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A
Rated Interruption Capacity	1000A, 250V AC (50/60Hz), 65V DC	2,500A, 220V AC 50/60Hz (1-pole) 1,500A, 220V AC 50/60Hz (2-pole) 1,500A, 65V DC (1-pole) 1000A, 65V DC (2-pole)
Approvals	UL, CSA	UL, CSA



1. For NRBM dimensions, see page N-25.
2. For NRC dimensions, see page N-26.
3. All switch only units are not CSA certified.
4. UL recognized, applicable standard: UL1077, "Supplementary Protectors."
5. Not suitable for branch circuit protection.

## NRA Series

Key features of the NRA series include:

- Available in 5 different styles
- Excellent overload and short circuit protection
- Small size and high-efficiency
- Life expectancy of over 10,000 operations
- UL1077 recognized "Supplementary Protectors"



**NRAS**



**NRAN**



**NRAR  
Rocker**



**NRAR  
Illuminated Rocker  
(neon lamp)**



UL Recognized  
File No. E68029  
E74843



CSA Certified  
File No. LR47985



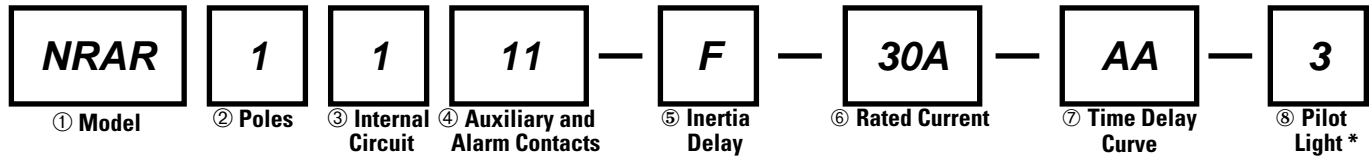
<b>Specifications</b>	<b>Protection Method</b>	Electromagnetic tripping
	<b>Internal Circuit</b>	Series current trip
	<b>Number of Poles</b>	NRAS and NRAN: 1, 2, 3 NRAR: 1
	<b>Rated Voltage</b>	250V AC, 50/60Hz, 65V DC
	<b>Rated Tripping Currents</b>	0.30A, 0.50A, 0.75A 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A
	<b>Rated Interrupting Capacity</b>	250V AC, 50/60Hz, 1,000A 65V DC, 1,000A
	<b>Auxiliary Contact Alarm Contact</b>	SPDT microswitch 250V AC, 5A (resistive load) 50V DC, 1A (resistive load)
	<b>Reference Temperature</b>	25°C
	<b>Operating Temperature</b>	-40 to +85°C (avoid freezing)
	<b>Insulation Resistance</b>	100MΩ minute (measured with 500V megger)
	<b>Dielectric Strength</b>	Between main circuit terminals: 2,000V AC, 1 minute Between main circuit and auxiliary contact: 2,000V AC, 1 minute
	<b>Vibration Resistance</b>	100N (approximately 10G) (10 to 100Hz)
	<b>Shock Resistance</b>	1,000N (approximately 100G)
	<b>Life Expectancy</b>	Minimum 10,000 cycles (at 6 operations per minute)
<b>Termination</b>	Main terminal: Quick-connect receptacle 0.250" (accepts M3.5 screw terminal adapter) Auxiliary contact, alarm contact: Quick-connect receptacle 0.080"	
<b>Illumination Voltage (NRAR illuminated units)</b>	Neon: 120, 240V AC, 50/60Hz LED: 12, 24V DC	



1. NRAR is not CSA certified.
2. Not suitable for branch circuit protection.

## Part Numbering Guide

NRA series part numbers are composed of up to 8 part number codes. When ordering an NRA series part, select one code from each category.  
 Example: NRAR 1 1 11 -F - 30A -AA -3



### Part Number Codes: NRA Series

	Description	Part Number Code	Remarks
① Model	Toggle (round cutout)	NRAS	
	Toggle (rectangular cutout)	NRAN	
	Rocker	NRAR	
② No. of Poles	1-pole	1	NRAR available in 1-pole only. All multi-pole circuit breakers are simultaneous throw/simultaneous break. All levers are mechanically interlocked.
	2-pole	2	
	3-pole	3	
③ Internal Circuit	Series current trip	1	
④ Auxiliary and Alarm Contacts	Without	00	
	With auxiliary contact	11	
	With alarm contact	21	
⑤ Inertia Delay	Without inertia delay	Blank	
	With inertia delay	F	
⑥ Rated Current	Rated current (current trip)	0.30A, 0.50A, 0.75A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A	All current ratings must be listed in amps (A). Example conversions: 50mA = 0.05A, 300mA = 0.30A.
⑦ Time Delay Curve	DC curves	AD, MD	For time delay curves, see page N-9.
	AC curves	AA, BA, MA	
⑧ Pilot Light*	With neon light 120V AC (50/60Hz)	1	* Applicable to illuminated NRAR only.
	With neon light 240V AC (50/60Hz)	2	



1. For NRA series accessories, see page N-7.
2. For NRA series time delay curves, see page N-9.
3. For NRA series dimensions, see page N-25.
4. Not suitable for branch circuit protection.
5. UL recognized, applicable standard: UL1077, "Supplementary Protectors."
6. NRAR is not CSA certified.

## Information About Circuit Breakers

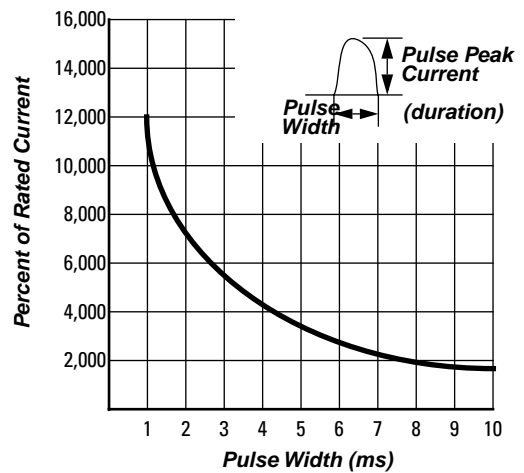
### Time Delay Curve Descriptions

Time Delay Curve	NRA Application
AD, AA	Common curves used in molded-case circuit breakers.
BA	Response to overcurrent is quite fast. Suited for protection of semiconductor circuits with very little overload tolerance. If overcurrents are expected to flow, fuses may be required according to the circuit characteristics.
MD, MA	Suited for motor loads that draw high inrush currents lasting a considerable length of time.
With Inertia Delay	Designed not to trip on 20 times the rated current (peak value) for a duration of 8ms. Suited for transformer and lamp loads that draw steep inrush currents.

### Inertia Delay Descriptions

Circuit breakers equipped with inertia delay do not respond to high inrush currents such as those produced by transformer, lamp, or motor loads, but perform the specified interruption on the rated overcurrents.

Specify inertia delay by inserting an "F" in the part number as shown in Part Number Guide on previous page.



$$1. \text{ Percent of Rated Current} = \frac{\text{Pulse Peak Current}}{\text{Protector Rated Current}} \times 100\%$$

2. Based on sinusoidal or parabolic pulse profile.

## Notes

### Multi-Pole

Multi-pole types such as 2- or 3-pole should be assembled by IDEC.

**Because of their characteristics, 1-pole breakers cannot be combined to provide multi-pole units.**

### Auxiliary and Alarm Contacts

Multi-pole units can incorporate auxiliary and alarm contacts.

**Auxiliary and alarm contacts will not work with IDEC's DIN rail adapters.**

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## Accessories

### Part Numbers: NRA Series Accessories

Description	Appearance	Part No.	Remarks
Color Caps (NRAS only)	Red	NR5R	<p>Colored caps fit onto NRAS circuit breakers for color coding circuits and improving the appearance of the panel.</p>
	Blue	NR5S	
	Yellow	NR5Y	
	White	NR5H	
Terminal Socket		MS-1C	For connection with auxiliary or alarm contact terminals.
Screw Terminal Adapter (1 pair)		NRT	For use on main terminals only. Includes M3.5 clamp screw. For dimensions see page N-25.

### Part Numbers: NRA Mounting Accessories

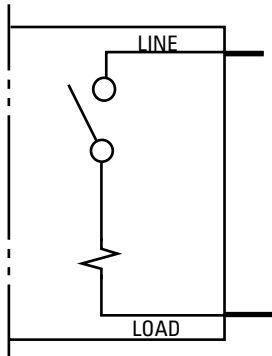
Description	Appearance	For Model	No. of Poles	Part No.	Remarks
Panel Mount Flush Plate		NRAN NRAR	1-pole	NR31	Use of a flush plate makes snap-in mount possible for NRAN, and NRAR circuit breakers (tightening screws not necessary). Multiple units can mount in a single panel cut-out.
		NRAN	2-pole	NR32	
		NRAN	3-pole	NR33	
DIN Rail Plug-in Base		NRAS NRAN	1-pole	NR21	<ol style="list-style-type: none"> <li>Furnished with a hold-down spring.</li> <li>Applicable only for series trip units up to 20 amps.</li> <li>Not applicable for NRAR lighted series.</li> <li>Not for use with circuit breakers incorporating auxiliary or alarm contacts.</li> </ol>
		NRAS NRAN	2-pole	NR22	
		NRAS NRAN	3-pole	NR23	
		NRAR	1-pole	NR211	
Surface Mount Plug-in Base		NRAS NRAN	1-pole	NUS1	
		NRAS NRAN	2-pole	NUS2	
		NRAS NRAN	3-pole	NUS3	
		NRAR	1-pole	NUS11	



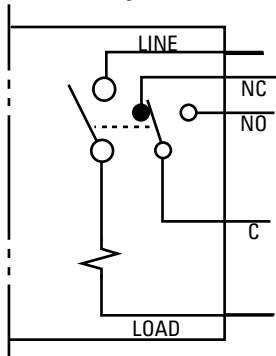
For dimensions of NRA series accessories and panel cut-out layouts, see drawings starting on page N-25.

## Internal Circuits and Terminal Arrangements: NRAS and NRAN Series

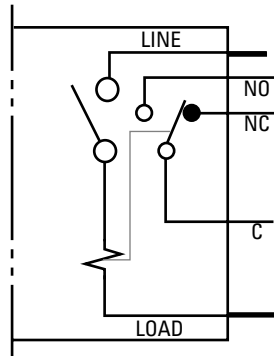
Series Current Trip



Series Current Trip with Auxiliary Contacts

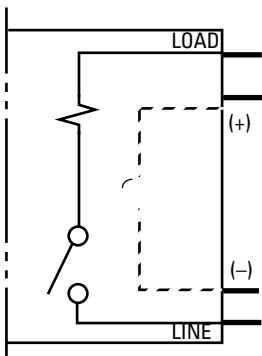


Series Current Trip with Alarm Contacts

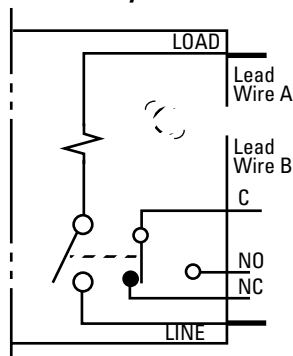


## Internal Circuits and Terminal Arrangements: NRAR Series

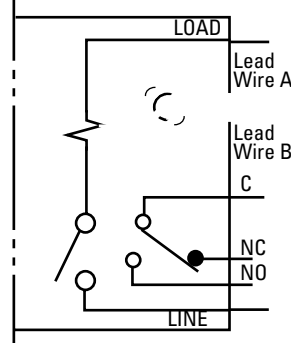
Series Current Trip



Series Current Trip with Auxiliary Contacts



Series Current Trip with Alarm Contacts



### Pilot Lights (NRAR only)

Pilot Light	Lead Wire	
	A	B
Neon (120V AC)	White	White
Neon (240V AC)	Black	Black

Dashed lines represent NRAR illuminated rocker units. Lead wires for neon pilot light/LED are color-coded as shown above.



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## Time Delay Curves (numerical equivalent)

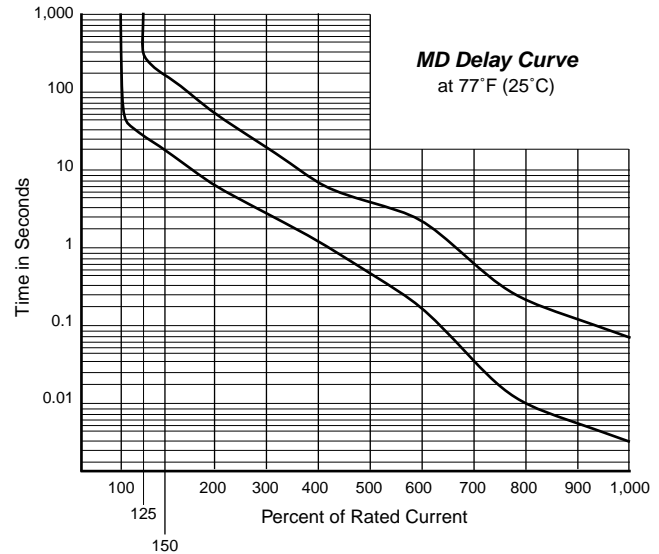
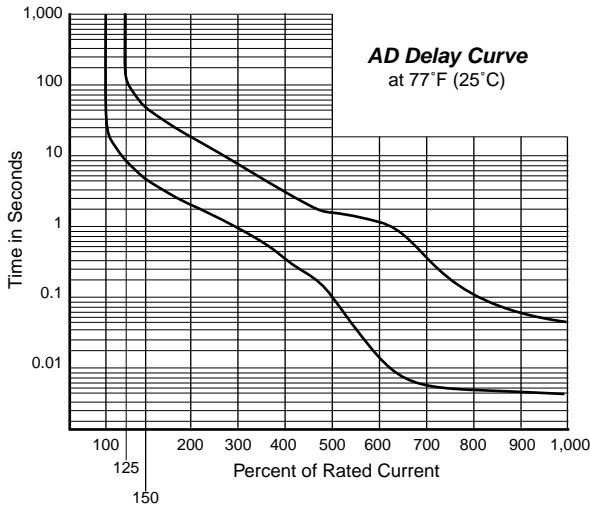
### Overcurrent — Time Delay Characteristics in Seconds (at 25°C)

		Percent of Rated Current							
	Curve	100%	125%	150%	200%	400%	600%	800%	1000%
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
AC (50/60Hz)	AA	No trip	10 – 120	6 – 45	2.2 – 15	0.3 – 2	0.05 – 0.55	0.007 – 0.13	0.005 – 0.04
	BA	No trip	0.75 – 10	0.45 – 3.5	0.22 – 1.3	0.045 – 0.22	0.012 – 0.12	0.005 – 0.06	0.004 – 0.03
	MA	No trip	60 – 900	30 – 260	9 – 70	1.5 – 8	0.18 – 2.5	0.009 – 0.25	0.006 – 0.08

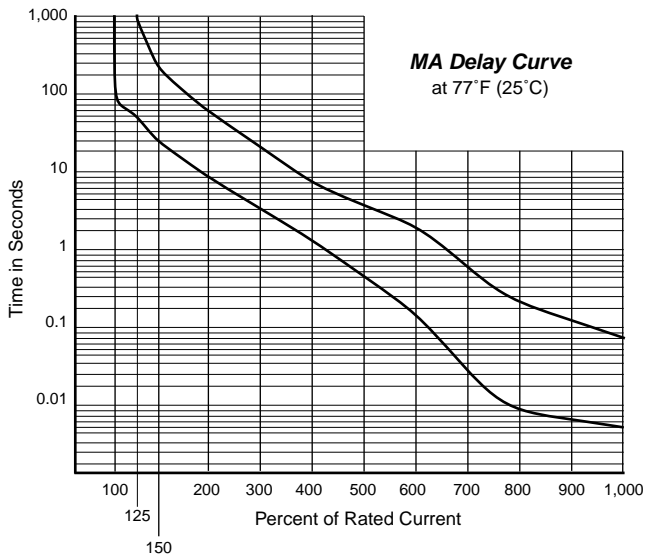
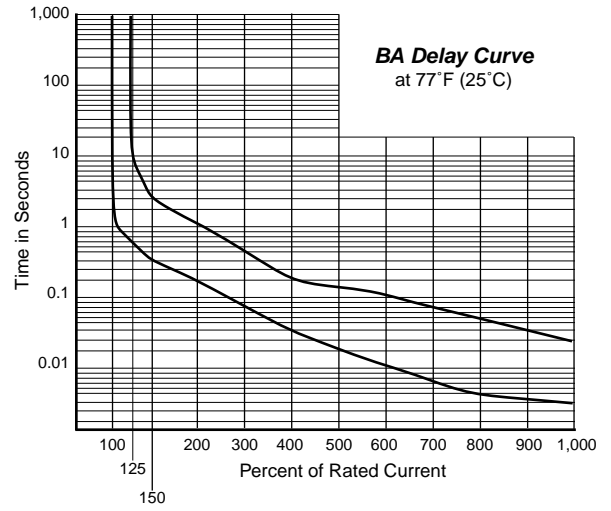
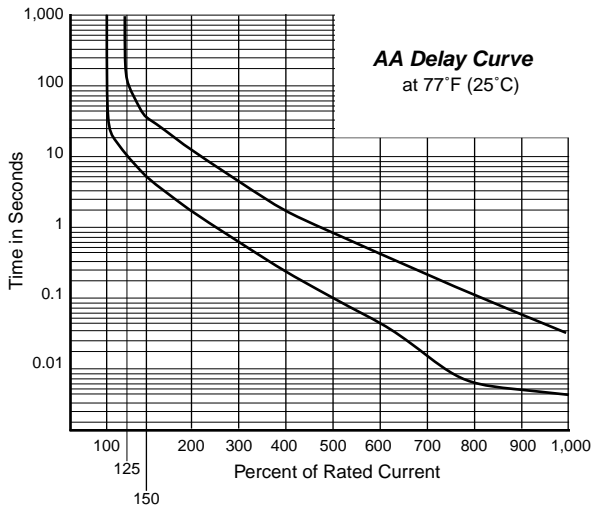


1. All values above are in seconds.
2. Data in this table is equivalent to information presented in following time delay curves.

### DC Time Delay Curves



## AC (50/60Hz) Time Delay Curves



## Resistance and Impedance Characteristics

### Coil Data for Series Current Trip at 25°C

Rated Current	DC Resistance	AC Impedance (50/60Hz)
	Curves AD, MD	Curves AA, BA, MA
0.30A	9.67Ω	9.82Ω
0.50A	3.24Ω	3.36Ω
0.75A	1.45Ω	1.49Ω
1A	0.90Ω	0.92Ω
2A	0.21Ω	0.21Ω
3A	0.09Ω	0.092Ω
5A	0.036Ω	0.036Ω
7.5A	0.017Ω	0.018Ω
10A	0.012Ω	0.012Ω
15A	0.0066Ω	0.0068Ω
20A	0.0048Ω	0.0048Ω
25A	0.0043Ω	0.0043Ω
30A	0.0036Ω	0.0041Ω



Tolerance ±25% (up to 20A), ±50% (25A and over).

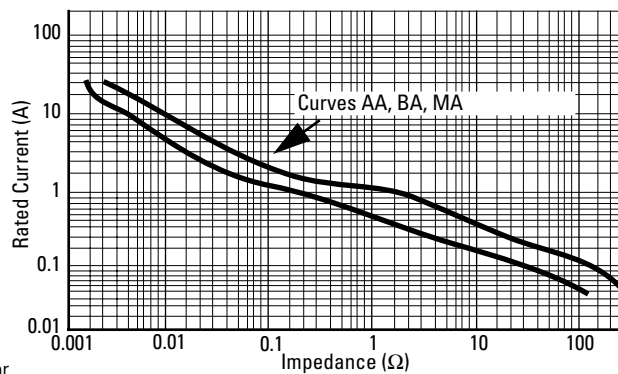
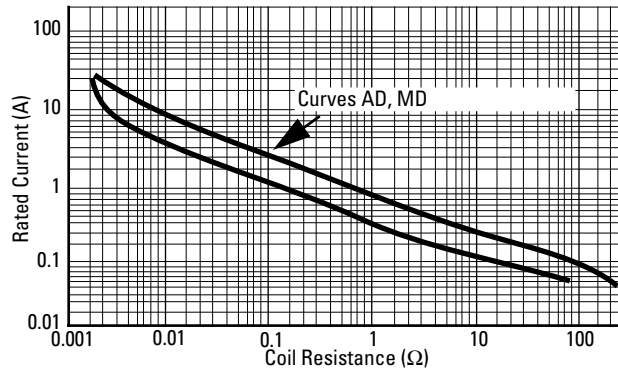
### Voltage Drop Due to Resistance or Impedance

The internal resistance or impedance of a circuit breaker tends to be larger for a smaller rated current. Therefore, when circuit breakers with a small rated current are used, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves, even at the same rated current. This should also be considered during installation.

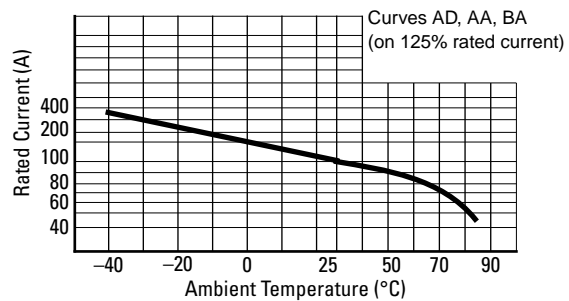
### Time Delay Curve and Ambient Temperature

Since NRA series circuit breakers employ an electromagnetic tripping system, the rated current (trip current) is not affected by the ambient temperature, but the time delay varies with the oil viscosity in the tube. Lower oil viscosity at higher temperatures results in shorter delay; whereas at lower temperatures, the delay will be prolonged. The time delay curves, shown starting on page N-9, are at 25°C. Time delay curves can be corrected.

Coil Resistance at 25°C



Temperature Correction Curves



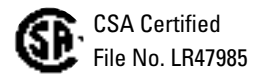
## NRBM Series



NRBM circuit breakers are the largest in rated current (1A to 50A) among the IDEC circuit breakers series. These small sized, high-efficiency breakers offer a variety of protection characteristics that can be widely employed for semiconductors, relay circuits, heater circuits, transformers, and solenoids.

Key features of the NRBM series include:

- Available with different internal circuits
- Excellent overload and short circuit protection
- Small size and high efficiency
- Life expectancy of over 10,000 operations
- UL1077 recognized "Supplementary Protectors"



<b>General Specifications</b>	<b>Protection Method</b>	Electromagnetic tripping
	<b>Internal Circuit</b>	Series current trip
	<b>Number of Poles</b>	1, 2, 3
	<b>Rated Voltage</b>	250V AC, 50/60Hz, 65V DC
	<b>Rated Tripping Currents</b>	Current trip: 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A
	<b>Rated Interrupting Capacity</b>	250V AC, 50/60Hz, 1,000A 65V DC, 1,000A
	<b>Auxiliary Contacts Alarm Contact</b>	SPDT microswitch 250V AC, 5A (resistive load) 50V DC, 1 A (resistive load)
	<b>Reference Temperature</b>	25°C
	<b>Ambient Operating Temperature</b>	-40 to +85°C (avoid freezing)
	<b>Insulation Resistance</b>	100MΩ minutes (measured with 500V megger)
	<b>Dielectric Strength</b>	Between main circuit terminals: 2,000V AC, 1 minute Between main circuit and auxiliary contact: 2,000V AC, 1 minute
	<b>Vibration Resistance</b>	100N (approximately 10G), 10 to 55Hz
	<b>Shock Resistance</b>	1,000N (approximately 100G)
	<b>Life Expectancy</b>	10,000 operations minimum (at 6 operations per minute)
	<b>Terminal Style</b>	Main terminal: M5 stud Auxiliary contact/ alarm contact: Quick-connect tab 0.110" terminal
<b>Weight</b>	1-pole/100g 2-pole/200g 3-pole/300g	

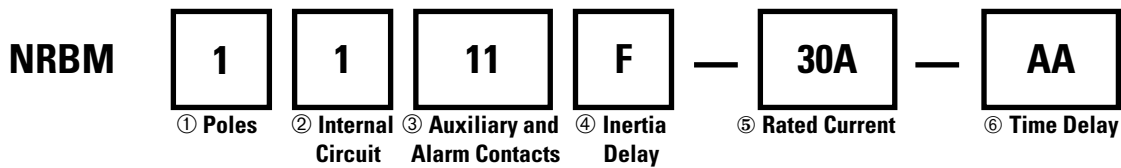
N



1. Not suitable for branch circuit protection.

## Part Numbering Guide

NRBM series part numbers are composed of 6 part number codes. When ordering an NRBM series part, select one code from each category.  
 Example: NRBM 1 1 11 F-30A-AA



### Part Number Codes: NRBM Series

	Description	Part Number Code	Remarks
① No. of Poles	1-pole	1	All multiple circuit breakers are simultaneous throw/simultaneous break. All levers are mechanically interlocked.
	2-pole	2	
	3-pole	3	
② Internal Circuit	Series current trip	1	
③ Auxiliary and Alarm Contacts	Without	00	Alarm contacts are available only on series trip units.
	With auxiliary contact	11	
	With alarm contact	21	
④ Inertia Delay	Without inertia delay	Blank	Inertia delay is available with curves AD, MD, AA, BA, and MA.
	With inertia delay	F	
⑤ Rated Current	Rated current (series current trip)	1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A	All current ratings must be listed in amps (A). Example conversions: 50mA = 0.05A, 300mA = 0.30A. Leave blank for switch only units.
⑥ Time Delay Curve	DC curves	AD, MD	See page N-16 for delay curves. Leave blank for switch only units.
	AC curves	AA, BA, MA	



1. For NRBM series accessories, see page N-15.
2. For NRBM series time delay curves, see page N-16.
3. For NRBM series dimensions, see page N-25.
4. Not suitable for branch circuit protection.
5. UL recognized, applicable standard: UL1077, "Supplementary Protectors."
6. Switch only types are not CSA certified.

## Information About Circuit Breakers

### Time Delay Curve Descriptions

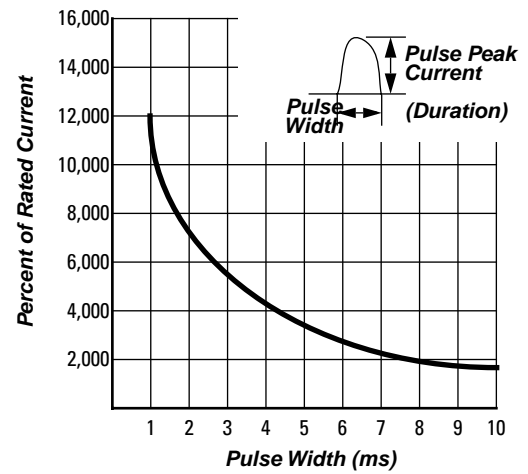
Time Delay Curve	NRBM Application
AD, AA	Common curves used in molded-case circuit breakers.
BA	Response to overcurrent is quite fast. Suited for protection of semiconductor circuits with very little overload tolerance. If overcurrents are expected to flow, fuses may be required according to the circuit characteristics.
MD, MA	Suited for motor loads that draw high inrush currents lasting a considerable length of time.
With Inertia Delay	Designed not to trip on 20 times the rated current (peak value) for a duration of 8ms. Suited for transformer and lamp loads that draw steep inrush currents.

### Inertia Delay Descriptions

Circuit breakers equipped with inertia delay do not respond to high inrush currents such as those produced by transformer, lamp, or motor loads, but perform the specified interruption on the rated overcurrents.

Inertia delay is available with time delay curves AD, MD, AA, BA, and MA.

Specify inertia delay by inserting an "F" in the part number as shown in Part Number Guide on previous page.



$$1. \text{ Percent of Rated Current} = \frac{\text{Pulse Peak Current}}{\text{Protector Rated Current}} \times 100\%$$

2. Based on sinusoidal or parabolic pulse profile.

## Notes

### Multi-Pole

Multi-pole types such as 2- or 3-pole should be assembled by IDEC.

**Because of their characteristics, 1-pole breakers cannot be combined to provide multi-pole units.**

All multi-pole units are simultaneous break/simultaneous make, with levers mechanically interlocked.

### Auxiliary and Alarm Contacts

Multi-pole units with auxiliary contacts will have one set of auxiliary contacts on the right-most breaker. Multi-pole units with alarm contacts will have one set of alarm contacts on the left-most breaker.

## Accessories

### Part Numbers: NRBM Mounting Accessories

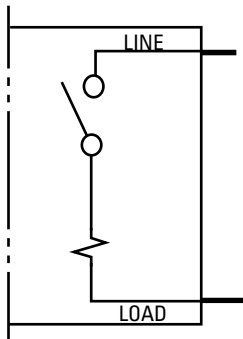
Description	Appearance	Part No.	Remarks
Terminal Socket		MS-1C	For connection with auxiliary or alarm contact terminals.



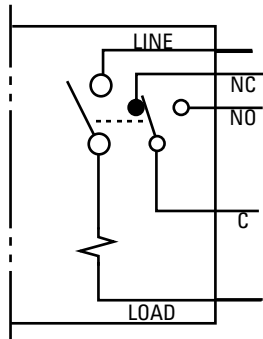
For dimensions of NRBM series accessories, see page N-25.

## Internal Circuits and Terminal Arrangements

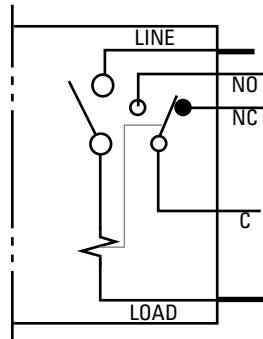
Series Current Trip



Series Current Trip with Auxiliary Contacts



Series Current Trip with Alarm Contacts



## Time Delay Curves (numerical equivalent)

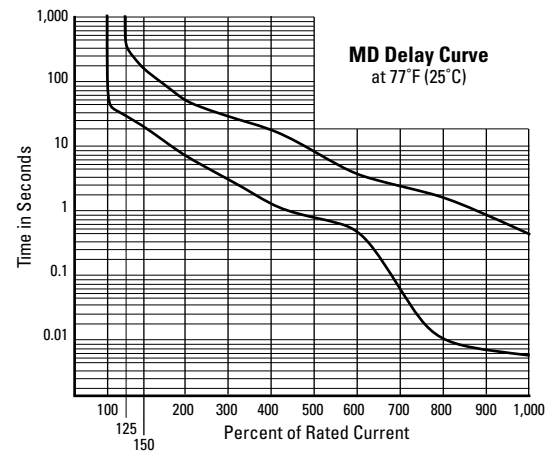
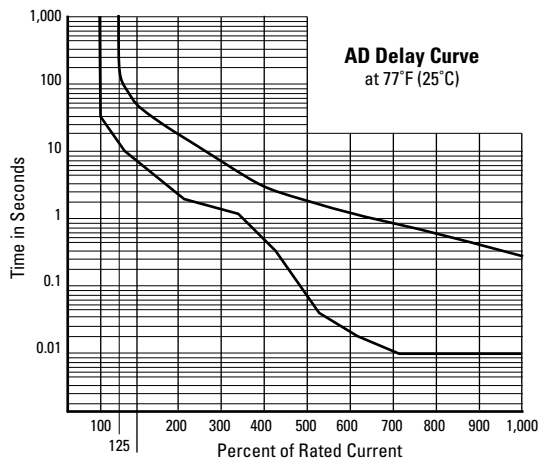
### Overcurrent — Time Delay Characteristics (at 25°)

		Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
DC	<b>AD</b>	No trip	10 – 130	6 – 55	2.6 – 20	0.5 – 3.5	0.14 – 1.4	0.008 – 0.7	0.005 – 0.35
	<b>MD</b>	No trip	35 – 400	20 – 180	8 – 60	1.6 – 10	0.6 – 4.5	0.01 – 2	0.007 – 0.5
AC (50/60Hz)	<b>AA</b>	No trip	15 – 120	8 – 45	3 – 15	0.48 – 2.5	0.06 – 0.8	0.007 – 0.13	0.005 – 0.04
	<b>BA</b>	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
	<b>MA</b>	No trip	70 – 900	30 – 260	10 – 70	1.8 – 11	0.5 – 4	0.009 – 1.1	0.006 – 0.2

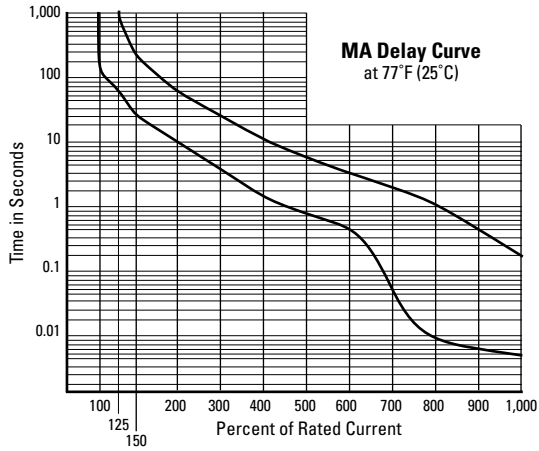
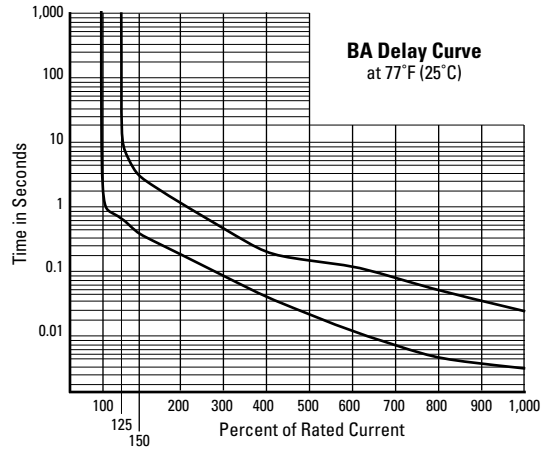
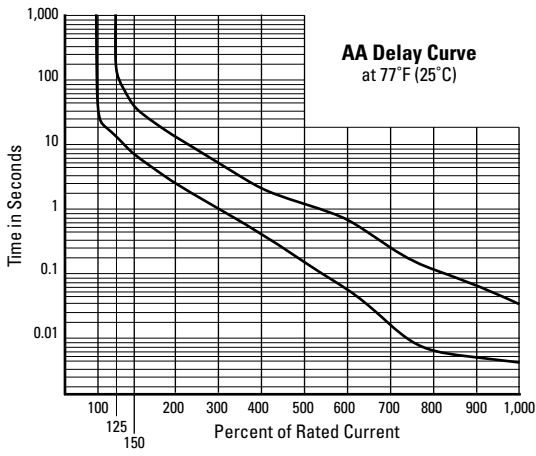


1. All values above are in seconds.
2. Data in this table is equivalent to information presented in following time delay curves.

## DC Time Delay Curves



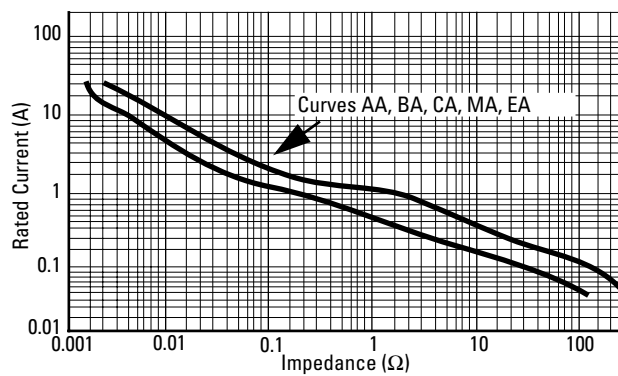
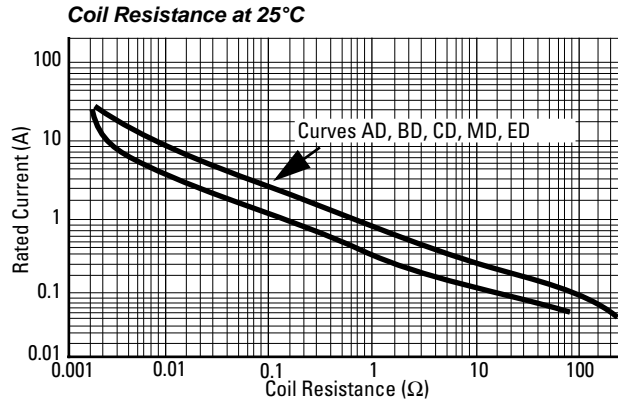
**AC (50/60Hz) Time Delay Curves: NRBM Series**



## Resistance and Impedance Characteristics

### Coil Data for series Current Trip at 25°C

Rated Current	DC Resistance	AC Impedance (50/60Hz)
	Curves AD, MD	Curves AA, BA, MA
0.05A	382Ω	430Ω
0.10A	85.4Ω	110Ω
0.25A	12.6Ω	16Ω
0.03A	9.2Ω	12Ω
0.50A	3.76Ω	4.3Ω
0.75A	1.47Ω	1.75Ω
1A	1Ω	1.1Ω
2A	0.227Ω	0.245Ω
3A	0.091Ω	0.11Ω
5A	0.035Ω	0.039Ω
7.5A	0.015Ω	0.018Ω
10A	0.0088Ω	0.0124Ω
15A	0.005Ω	0.0065Ω
20A	0.003Ω	0.0047Ω
25A	0.0023Ω	0.0032Ω
30A	0.0019Ω	0.0031Ω
40A	0.0018Ω	0.002Ω
50A	0.0014Ω	0.0016Ω



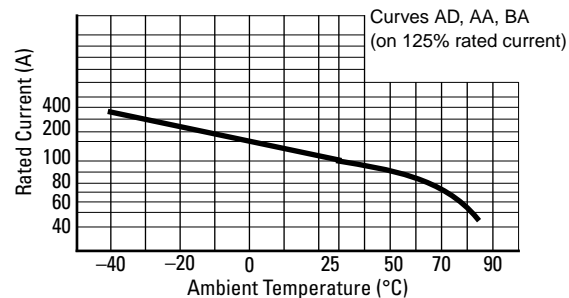
Tolerance ±25% (up to 20A), ±50% (25A and over)

### Voltage Drop Due to Coil Resistance or Impedance

The internal resistance or impedance of a circuit breaker tends to be larger for a smaller rated current. Therefore, when circuit breakers of a small rated current are used, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves, even at the same rated current. This should also be considered during installation.

### Time Delay Curve and Ambient Temperature

Since NRBM series circuit breakers employ an electromagnetic tripping system, the rated current (trip current) is not affected by the ambient temperature, but the time delay varies with the oil viscosity in the tube. Lower oil viscosity at higher temperatures results in shorter delay; whereas at lower temperatures, the delay will be prolonged. The time delay curves, shown starting on page N-16, are at 25°C. Time delay curves can be corrected.



## NRC Series

NRC series circuit breakers offer circuit protection which is far superior to using fuses in applications containing relay circuits, motor circuits, heater circuits, transformers, solenoid valves, and semiconductors.



Key features of the NRC series include:

- Mounting options include DIN rail, direct surface, or panel cut-out
- Designed for control circuit and power line protection
- Rated interrupting capacity of 2,500A (1-pole) and 1,500A (2-pole)
- Choice of slide or lever actuators
- All models equipped with reset trip indicators
- Models available for AC or DC loads
- Two curves available for long or short delay
- Available in 11 rated currents from 300mA to 30A
- Options include auxiliary contacts
- UL1077 recognized "Supplementary Protectors"



UL Recognized  
File No. E68029



CSA Certified  
File No. LR83454

Specifications	Load Type	AC	DC
	Protection Method	Electromagnetic tripping	
	Internal Circuit	Series current trip	
	Number of Poles	1, 2	
	Rated Voltage	250V AC, 50/60Hz, 65V DC	
	Rated Tripping Currents	0.30A, 0.50A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 30A	
	Rated Interrupting Capacity	2,500A, 250V AC, 50/60Hz (2-pole: 1,500A)	1,500A, 65V DC (2-pole: 1,000A)
	Auxiliary Contact	Optional SPDT contact output 250V AC 3A (resistive load) 65V DC 1A (resistive load))	
	Reference Temperature	40°C	
	Operating Temperature	-10 to +60°C (avoid freezing)	
	Insulation Resistance	100MΩ minutes (500V megger)	
	Dielectric Strength	Between the live part and the ground, between terminals of different poles, between terminals of the same pole, and between main circuit and auxiliary contact: 2,000V AC, 1 minute	
	Vibration Resistance	100N (approximately 10G) (10 to 55Hz)	
	Shock Resistance	500N (approximately 50G)	
	Life	10,000 operations minimum	
	Terminal Style	Main terminal: M4 screw (20A maximum) M5 screw (30A) Auxiliary terminal: M3.5 screw	
Weight (approximate)	1-pole: 115g, 2-pole: 230g		

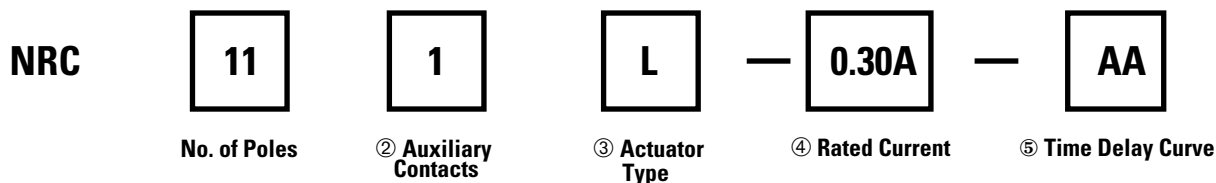


Not suitable for branch circuit protection.



## Part Numbering Guide

NRC series part numbers are composed of 5 part number codes. When ordering an NRC series part, select one code from each category.

Example: NRC111L-0.30A-AA



### Part Number Codes: NRC Series





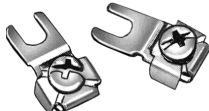

Appearance	Description	Part Number Code	Remarks
① No. of Poles	1-pole	11	
	2-pole	21	
② Auxiliary Contacts	No	0	
	Yes	1	
③ Actuator Type	 Slide	Leave blank	Slide actuator available only for 1-pole models.
	 Lever	L	
④ Rated Current		0.30A, 0.50A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 30A	
⑤ Time Delay Curve		AC curves: AA, EA; DC curves: AD, ED	



1. For NRC series accessories, see page N-21.
2. For NRC series time delay curves, see page N-22.
3. For NRC series dimensions, see page N-26.

## Accessories

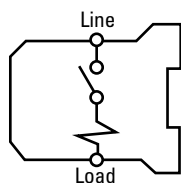
### Part Numbers: DIN Rail and Mounting Clips

Description	Appearance	Part No.	Remarks
<b>Aluminum DIN Rail</b> (1 meter length)		BNDN1000	For dimensional drawing, see page N-30.
<b>DIN Rail End Clip</b> Metal end clip used to prevent side-to-side movement of circuit breakers when mounted on a DIN rail. One clip required at each end.		BNL5	
<b>Panel Cut-Out Mounting Bracket</b> Mounting bracket used to mount circuit breaker(s) in panel cut-outs. Not applicable for models with auxiliary contacts (NRC111, NRC111L, NRC211L). When mounting 2-pole models (NRC210L), use two brackets side-by-side. It is recommended to use the "Fast-On Tab Terminal Adapter" (below) when using this bracket.		NRC-M	For dimensional drawings, see page N-26.
<b>Surface Mounting Bracket</b> Used for direct surface mounting 1-pole circuit breaker models.		NRC-F	For dimensional drawings, see page N-26.
<b>Fast-On Tab Terminal Adapter</b> Adapter used for Fast-On wiring termination. Fast-On tab extends 0.47" (12mm) in length. Cannot be used to replace models with M5 main terminals (30A). Fast-On terminal adapter recommended when using panel cut-out mounting bracket for rear wiring.		NRC-T	For dimensional drawings, see page N-30.
<b>Jumper</b> Used for jumping auxiliary terminals. The rated current for jumper is 3A.		NRC-J	

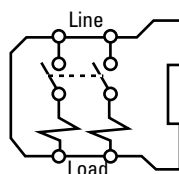


For dimensions of NRC series accessories, see page N-30.

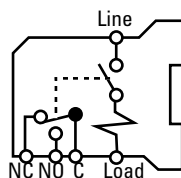
## Internal Circuit



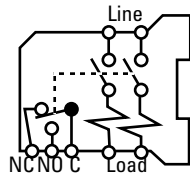
1-Pole without Auxiliary Contacts



2-Pole without Auxiliary Contacts



1-Pole with Auxiliary Contacts



2-Pole with Auxiliary Contacts

## Time Delay Curves (numerical equivalent)

### Overcurrent — Time Delay Characteristics in Seconds (at 40°C)

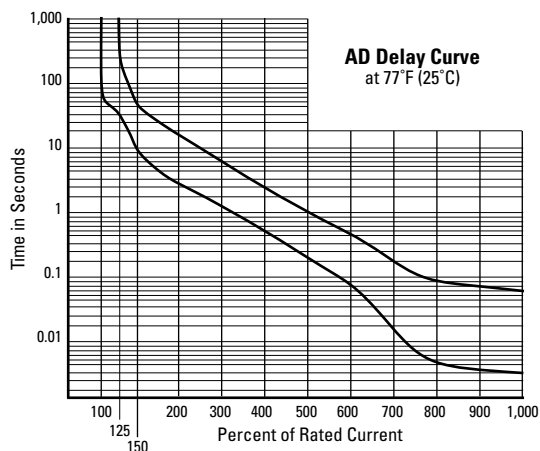
	Curve	Percent of Rated Current							
		100%	125%	150%	200%	400%	600%	800%	1000%
DC	AD	No trip	40 – 240	10 – 50	3.5 – 18	0.6 – 3	0.008 – 0.5	0.005 – 0.09	0.004 – 0.07
	ED	No trip	0.04 – 0.4	0.025 – 0.15	0.015 – 0.06	0.007 – 0.025	0.005 – 0.018	0.004 – 0.017	0.004 – 0.017
AC	AA	No trip	40 – 240	10 – 50	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



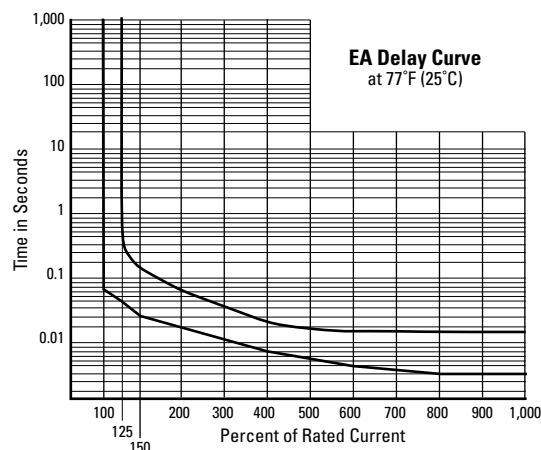
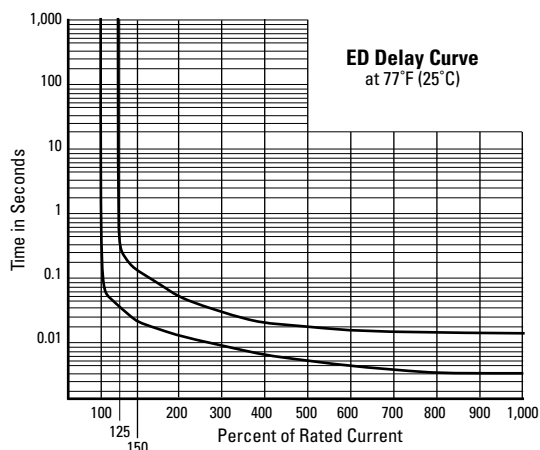
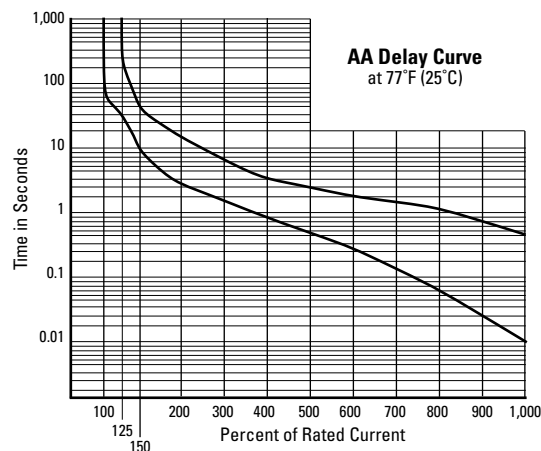
1. All values above are in seconds.
2. Data in this table is equivalent to information presented in following time delay curves.

## Time Delay Curves

### DC Time Delay Curves



### AC (50/60 Hz) Time Delay Curves



## Resistance and Impedance Characteristics

### Coil Impedance (at 40°C)

Rated Current	AC Impedance (50/60Hz)	DC Resistance
0.30A	15.1Ω	25.6Ω
0.50A	5.58Ω	9.04Ω
1A	1.54Ω	2.33Ω
2A	0.341Ω	0.548Ω
3A	0.162Ω	0.261Ω
5A	0.061Ω	0.099Ω
7A	0.031Ω	0.048Ω
10A	0.017Ω	0.026Ω
15A	0.008Ω	0.013Ω
20A	0.0058Ω	0.0075Ω
30A	0.0039Ω	0.0046Ω

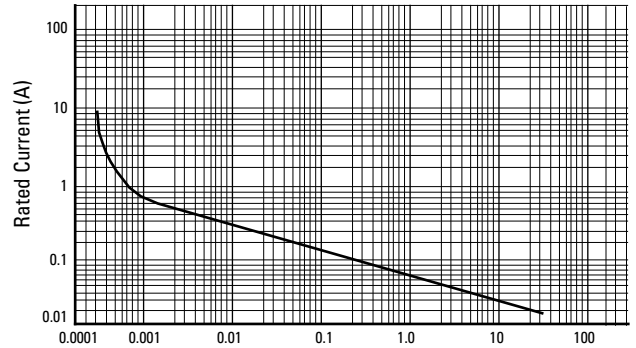


Tolerance: ±10% (0.3A to 3A), ±25% (5A to 30A).

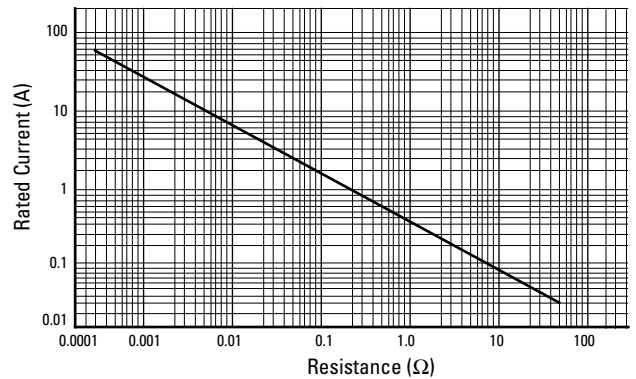
### Voltage Drop Due to Coil Impedance

The internal impedance of a circuit breaker tends to be larger for a smaller rated current. Therefore, when low rated circuit breakers are used, the voltage drop should be taken into consideration.

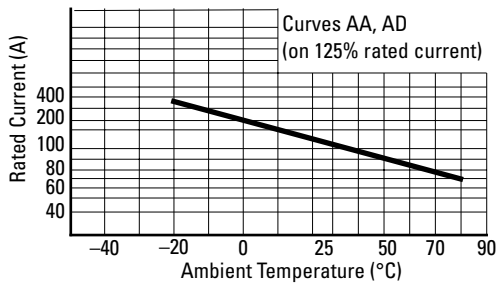
AC Impedance at 40°C



DC Resistance at 40°C



## Temperature Correction Curve



## Instructions: All Series

### General

IDEC's circuit breakers have been developed for the protection of electrical circuits and small-sized electrical equipment and provide excellent protection against overloads and short-circuits.

Additionally, IDEC's circuit breakers are designed to suit specific needs. Each series offers unique circuit protection characteristics and a choice of actuator styles.

### IDEC's Circuit Breaker Features

- Various models are available with different internal circuits, tripping characteristics, and rated currents
- 1- to 3- multi-pole
- Inertia delay
- Auxiliary contacts and alarm contacts
- The electromagnetic tripping system is not affected by ambient temperature
- Safe trip-free mechanism
- Vibration- and impact-resistant design
- When using accessories such as plug-in bases, flush plates, and colored caps, a variety of mounting styles is possible — such as DIN rail mounting, snap mounting into panel cut-outs, and color-coded arrangement on the panel

### Mounting Instructions: Installation Angle

Designed to be mounted on a vertical surface, the circuit breakers should be mounted on a surface within 10° of the vertical plane. If the circuit breaker is mounted on a horizontal surface or at any angle other than the specified angle, its characteristics will be changed.

### Multi-Pole Assemble

Multi-pole types such as 2- or 3-pole should be assembled by IDEC. **Because of their characteristics, 1-pole breakers cannot be combined to produce multi-pole units.**

### Applications

The IDEC NRA circuit breaker series features superior overload and short-circuit protection. Many combinations of protection mechanisms and internal circuit connections enable wide applications.

- **Precision measuring instruments:** electronic counters, projection instruments, oscilloscopes, industrial instrumentation, and analytic devices
- **Electronic communication devices:** facsimile machines, computers, recorders
- **Industrial machinery:** printers, elevators, cranes
- **Chemical and food industry machines:** vacuum devices, wrappers, centrifuges, agitators
- **Machine tools:** mill grinders, drills, presses
- **Business machines:** automatic vendors, medical equipment, beauty salon equipment, entertainment games
- **Other:** office equipment, air-conditioners, conveyor belts, and many more

### How the Breaker Operates

IDEC's hydraulic magnetic circuit breakers operate like a solenoid coil. The coil unit consists of an oil-filled tube with a metal core at one end and a pole piece and armature at the opposite end with a spring in between.


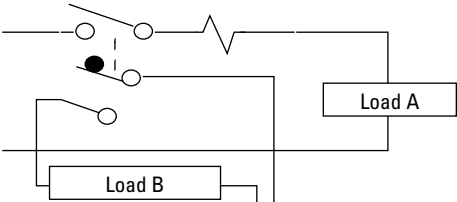
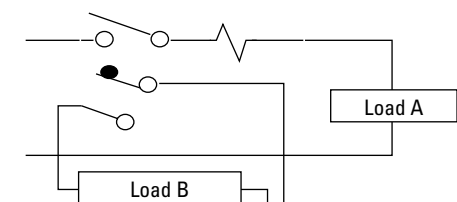
When a current load passes through the coil winding, it creates a magnetic field. As long as the current load is either at or below the nominal rating of the breaker, the metal core will remain stationary.

If the current load increases beyond the nominal rating, the strength of the magnetic field causes the core to move toward the pole-end of the tube. The oil viscosity regulates the core's movement through the tube, thereby regulating the time delay. As the percentage of current load increases, the required trip time of the breaker decreases and vice versa.

When the current reaches the overload rating, the metal core will meet the pole piece at the opposite end of the tube. At this point, the armature is attracted to the same pole piece, tripping the breaker.

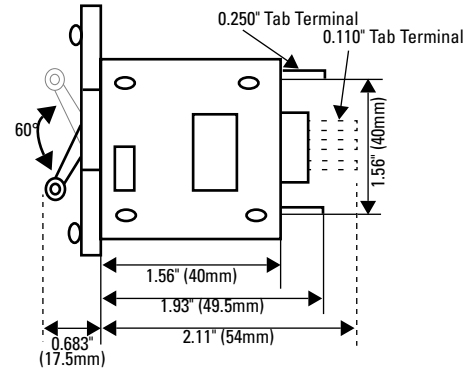
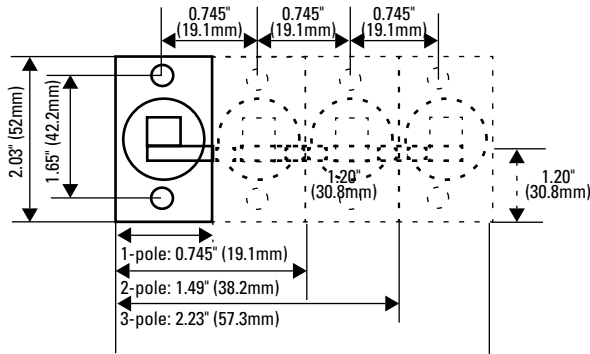
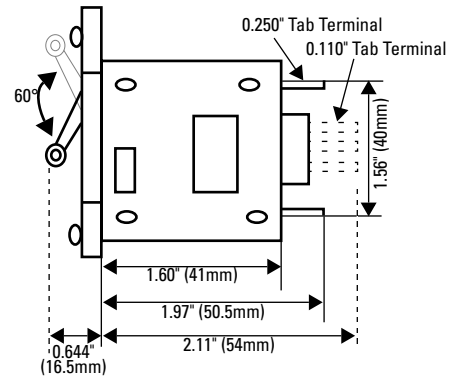
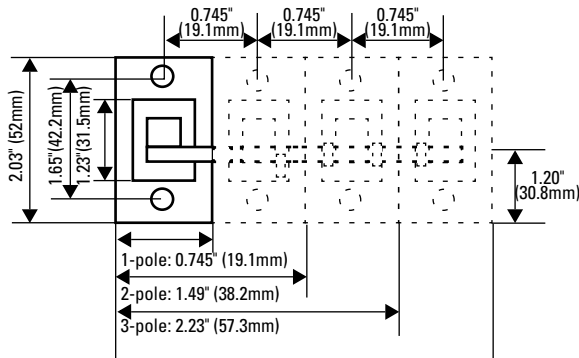
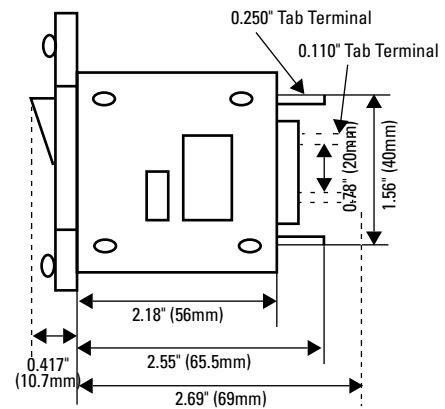
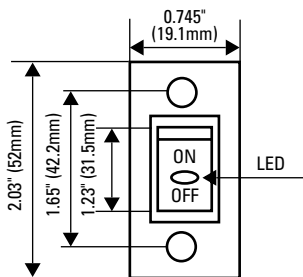
In case of sudden short circuit, the magnetic field created will instantly trip the breaker.

## Internal Circuits Overview

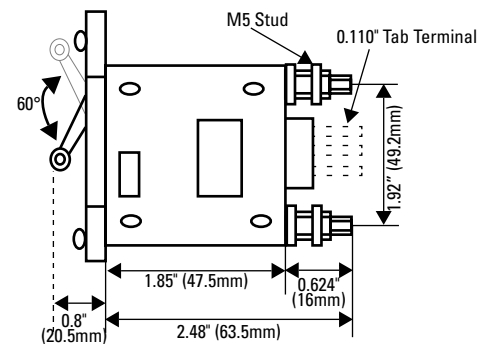
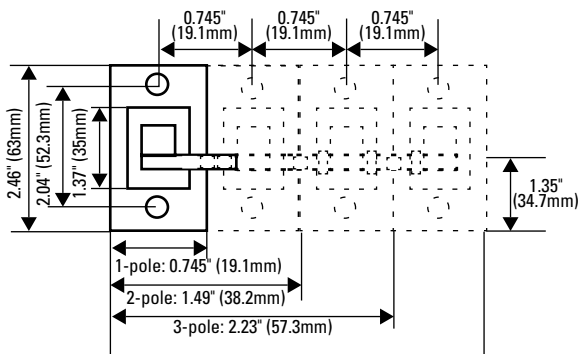
Description	Circuit Example
	<p><b>Series Trip</b> This is the most common circuit breaker, providing excellent overload and short circuit protection. It can also be used as an ON/OFF switch.</p>
	<p><b>Series Trip with Auxiliary Contact</b> Since the auxiliary contact operation is interlocked with the ON/OFF of the main contactor, circuit breaker operation can be monitored by a lamp or buzzer. This circuit breaker can also be used to control auxiliary circuits up to 250V AC/5A (resistive load).</p>
	<p><b>Series Trip with Alarm Contact</b> Since the alarm contact is electrically independent of the main contactor, but actuates when the protective element operates. The alarm can be used with a lamp or buzzer to monitor trip operations, and can also be used for controlling alarm circuits. The contact rating is 250V AC/5A (resistive load).</p>

## Dimensions

### Dimensions: NRA Series

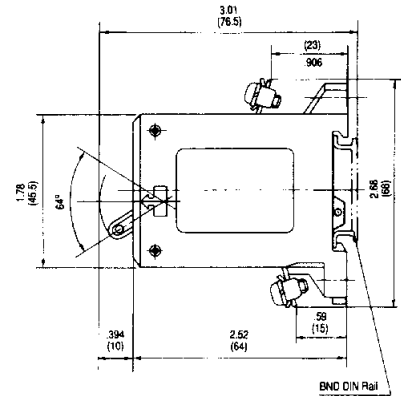
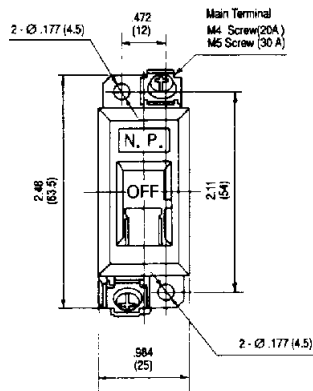
**NRAS**

**NRAN**

**NRAR**


### Dimensions: NRBM Series

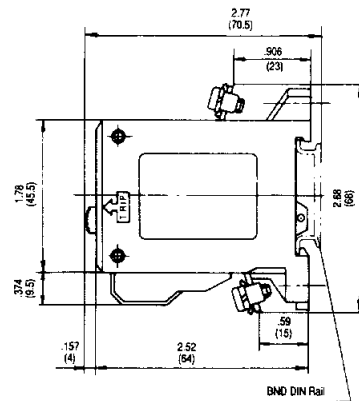
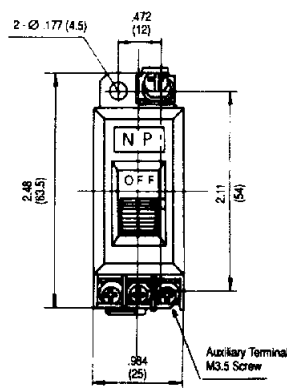
**NRBM**


## Dimensions: NRC Series

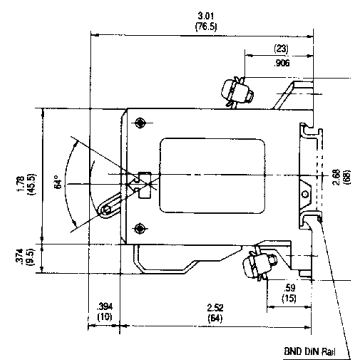
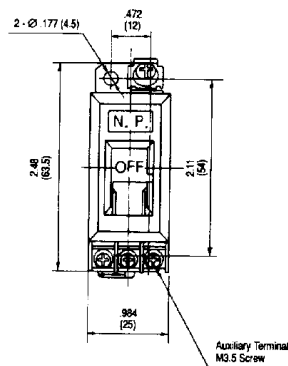
**NRC110**  
Slide Actuator  
1-Pole without Auxiliary Contacts



**NRC110L**  
Lever Actuator  
1-Pole without Auxiliary Contacts



**NRC111**  
Slide Actuator  
1-Pole with Auxiliary Contacts

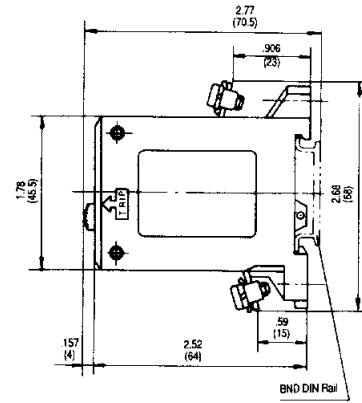
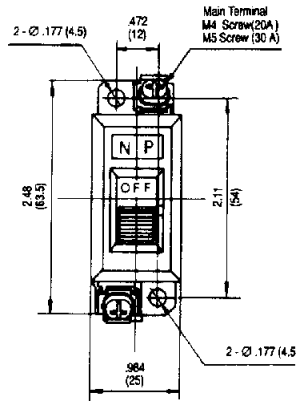


**Installation Angle:** Circuit breakers are designed to operate on a vertical surface. The mounting angle should not exceed a vertical plane by more than 10°.

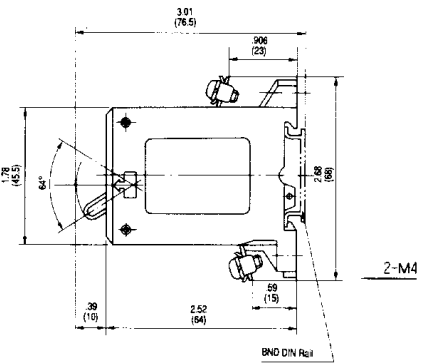
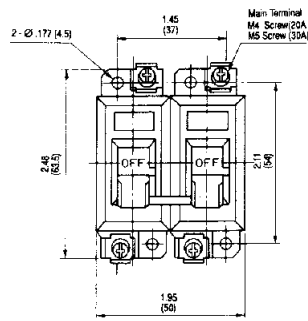


**Dimensions: NRC Series, continued**

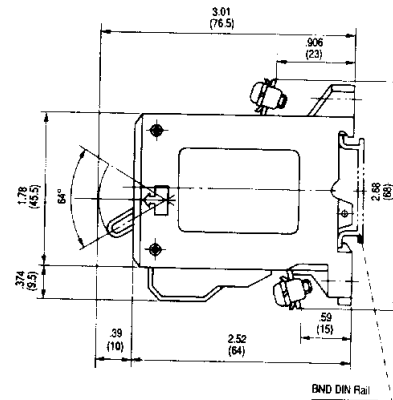
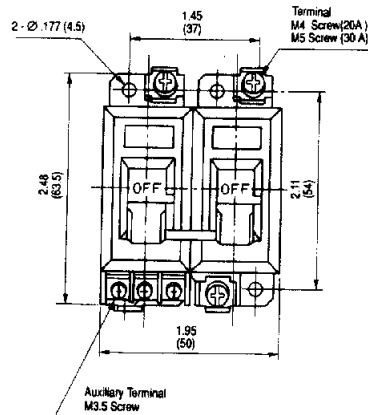
**NRC111L**  
Lever Actuator  
1-Pole with Auxiliary Contacts



**NRC210L**  
Lever Actuator  
2-Pole without Auxiliary Contacts



**NRC211L**  
Lever Actuator  
2-Pole with Auxiliary Contacts



**Installation Angle:** Circuit breakers are designed to operate on a vertical surface. The mounting angle should not exceed a vertical plane by more than 10°.

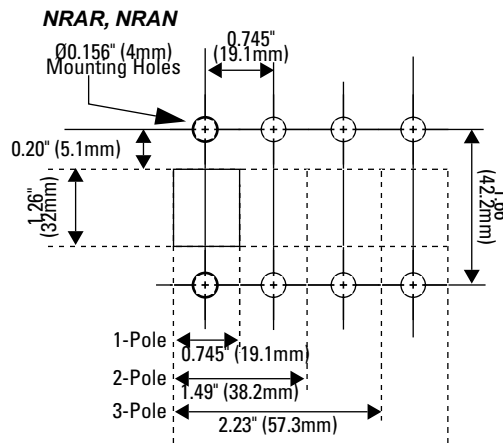
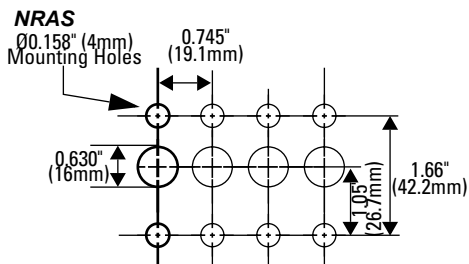


## Panel Cut-Outs

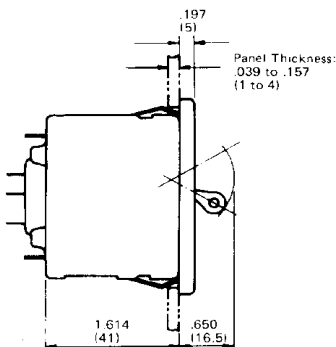
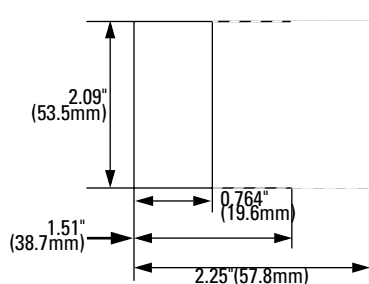


**Installation Angle:** Circuit breakers are designed to operate on a vertical surface. The mounting angle should not exceed a vertical plane by more than 10°.

### NRA Series



### NR31, NR32, NR33 — Panel Mount Flush Plate



Model	Maximum Mounting Distance		Schematics in Inches (mm)	
	A	B		
NRAS	3.02" (77.5mm)	3.57" (91.5mm)		
NRAN	3.02" (77.5mm)	3.57" (91.5mm)		
NRAR	3.38" (86.7mm)	3.93" (100.7mm)		

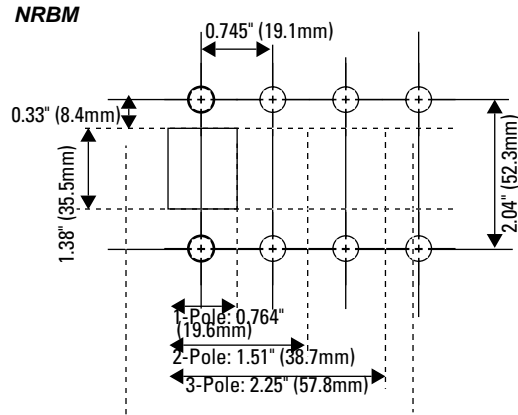
N

**Panel Cut-Outs, continued**



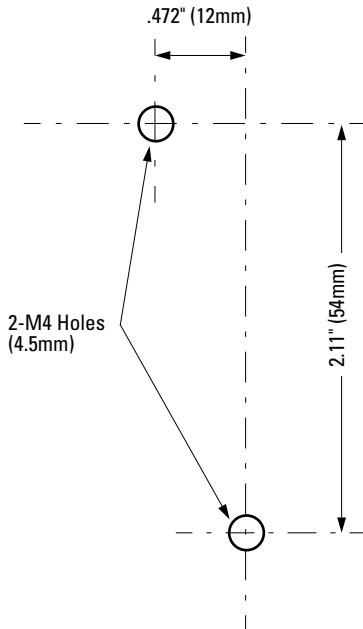
All drawings are not to scale unless scale is indicated.

**NRBM Series**



**NRC Series**

Surface Mounting Hole Layout 1-Pole



Surface Mounting Hole Layout 2-Pole

