B

1. General

NM8N series moulded case circuit breaker is suitable for the circuit of AC 50/60Hz, with rated voltage AC690V and below, DC system rated voltage DC1000V and below, and rated current of 16A and 1600A. It can protect circuits and electric equipment against overload, short circuit or undervoltage, and can also provide protection of overload, short circuit and under voltage for infrequent start of motor.

Certificates: CE, CB, KEMA;

Standard: IEC/EN 60947-2.

2. Operating conditions

2.1 Temperature:
Operating and storage temperature is -40° C~+70° C; the average value within 24 hours does not exceed +35° C; when the ambient temperature is -40° C~+70° C, users need to consider derating or temperature compensation whose details can be referred to in Page

2.2 Altitude: ≤ 2000m;

2.3 Pollution grade: Grade 3;

2.4 IP grade: IP40

2.5 Air conditions:
At mounting site, relative humidity not exceed 50% at the max temperature of +40 ℃ , higher relative humidity is allowable under lower temperature. For example, RH could be 90% at +20 ℃ , special measures should be taken to occurrence of dews.

B

3. Type designation

3.1 NM8N Moulded Case Circuit Breaker and Switch Disconnector

N M 8 N □ - □ □ □ □ □ □

- Special application
- Poles:
  1P: 1-pole
  2P: 2-pole
  3P: 3-pole
  4B: 4-pole, there is no over-current protection at pole N and N-pole operates with other three poles
  4C: 4-pole, there is over-current protection at pole N and N-pole operates with other three poles
- Rated current
  125 : 16-20-25-32-40-50-63-80-100-125
  250 : 32-63-100-125-160-180-200-225-250
  400 : 250-315-350-400
  630 : 400-500-630
  800 : 500-630-700-800
  1600 : 800-1000-1250-1600
- Release type code
  TM: Thermal-magnetic type
  EN: Basic electronic type for power distribution
  EM: Standard electronic type for power distribution
  M: Magnetic type for motor protection
  ENM: Basic electronic type for motor protection
  EMM: Standard electronic type for motor protection
  Blank: Switch disconnector type
- Breaking capacity code: B, C, S, Q, H, R
  (Switch disconnector type has no code)
- Frame size rated current:
  125: 125A; 250: 250A; 400: 400A
  630: 630A; 800: 800A; 1600: 1600A
- DC: DC MCCB
  Blank: AC MCCB
  SD: Switch disconnector
- Design code
- Design sequence number
- MCCB
- Company code

3.2 NM8NL Residual Current Circuit Breaker

N M 8 N L - □ □ □ □ □ □ □

- Rated residual current code:
  RCD1: 0.03-0.1-0.3-1A adjustable
  (Applicable to the frame size of 125-250-400-630)
- Rated residual current type:
  Default: AC type, A: A type
- Pole code:
  3P: 3-pole
  4B: 4-pole, there is no over-current protection at pole N and N-pole operates with other three poles
  4C: 4-pole, there is over-current protection at pole N and N-pole operates with other three poles
- Rated current :
  125 : 16-20-25-32-40-50-63-80-100-125
  250 : 32-63-100-125-160-180-200-225-250
  400 : 250-315-350-400
  630 : 400-500-630
- Release type code:
  TM: Thermal-magnetic type
  EN: Basic electronic type for power distribution
  EM: Standard electronic type for power distribution
  M: Magnetic type for motor protection
  ENM: Basic electronic type for motor protection
  EMM: Standard electronic type for motor protection
- Breaking capacity code: C/S/Q/H/R
- Frame size rated current:
  125: 125A; 250: 250A; 400: 400A; 630: 630A
- Residual current code
- Design code
- Design sequence number
- MCCB
- Company code

B

4. Technical data

NM8N Moulded Case Circuit Breaker		125					250					400					630					800					1600		
Rated current(A)	Magnetic type	16-20-25-32-40-50-63-80-100-125					125-160-180-200-225-250					250-315-350-400					400-500					500-630-700-800					—		
	Thermal-magnetic type	16-20-25-32-40-50-63-80-100-125					125-160-180-200-225-250					250-315-350-400					400-500					500-630-700-800					800-1000-1250-1600		
	Electronic type	—					32-63-100-160-250					250-400					400-630					630-800					800-1000-1250-1600		
Electric characteristics																													
Rated insulation voltage Ui (V)		1000					1000					1000					1000					1000					1000		
Rated impulse withstand voltage (kV)		8					8					12					12					12					8		
Rated operational voltage Ue(V),AC 50/60Hz		380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440,500,660/690					380/400/415,440, 500,660/690		
Breaking capacity code		C	S	Q	H	R	C	S	Q	H	R	C	S	Q	H	R	C	S	Q	H	R	C	S	Q	H	R	S	Q	H
Number of poles	1P	■	■	—	—	—	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2P	■	■	■	■	■	■	■	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rated ultimate short-circuit breaking capacityIcu(kA)	AC220/230/240V[1]	36	50	—	—	—	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	AC380/400/415V	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	50	70	100
	AC440V	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	50	65	—
	AC500V	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	100	40	50	—
	AC660/690V	6	8	8	10	10	6	8	8	10	10	10	12	12	15	15	10	12	12	15	15	12	15	15	20	30	30	30	30
Rated service breaking capacityIcs(kA)	AC220/230/240V[1]	36	50	—	—	—	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	AC380/400/415V	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	36	50	70	100	150	50	70	70
	AC440V	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	36	50	70	100	100	40	50	—
	AC500V	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	50	25	40	40	50	100	30	40	—
	AC660/690V	6	8	8	10	10	6	8	8	10	10	10	12	12	15	15	10	12	12	15	15	12	15	15	15	15	30	30	30
Rated short-time withstand current Icw (kA)		—					1(32A,63A);2(100A,160A);3(250A)					5					5(400A);8(630A)					10					20		
Standard		IEC/EN 60947-2, GB/T 14048.2										IEC/EN 60947-2, GB/T 14048.2																	
Utilization category		A					A					A(Thermal-magnetic)/B(Electronic)					A(Thermal-magnetic)/B(Electronic)					A(Thermal-magnetic)/B(Electronic)					A(Thermal-magnetic)/ B(Electronic)		
Ambient temperature		-40℃ ~+70℃ [2]										-40℃ ~+70℃ [2]																	
Safety of insulation		■					■					■					■					■					■		
Arcing distance		0					0					0					0					0					0		
Mechanical life (CO recycle)	Maintenance free	15000					15000					15000					15000					10000					6000		
Electrical life (CO recycle)	AC415V,In	8000					6000					4000					4000(400A)/3000(630A)					2000					1000		
	AC690V,In	2000					1500					1500					1500					1000					1000		
Release units																													
Distribution protection	TM	■					■					■					■					■					■		
	EN	—					■					■					■					■					■		
	EM	—					■					■					■					■					■		
Motor protection	M	■					■					■					■					■					■		
	ENM	—					■					■					■					■					—		
	EMM	—					■					■					■					■					—		
Mounting and connection																													
Fixed	Front connection	■					■					■					■					—					■		
	Rear connection	■					■					■					■					■					—		
Plug-in[3]	Front connection	■					■					■					■					—					—		
	Rear connection	■					■					■					■					—					—		
Draw-out[3]	Front connection	—					—					■					■					■					—		
	Rear connection	—					—					■					■					■					—		
DIN rail	Front connection	■					■					—					—					—					—		
Dimension																													
Dimension (mm) W×H×D	Width (1P/2P/3P/4P)	35/62/90/120					40/70/105/140					140/185					140/185					195/260					210/280		
	Height	140					157					255					255					300					286		
	Depth	78.5					88.7					113					113					133					167 (195) [4]		
Weight																													
Weight(kg)/Fixed	1P	0.5					0.75					—					—					—					—		
	2P	0.83					1.3					—					—					—					—		
	3P	1.19					1.85(TM/M); 2.0(EN/EM)					5.2(TM/M); 6.7(EN/EM)					5.5(TM/M); 7(EN/EM)					10.5(TM/M); 10.5(EN/EM)					13.5(16)[4]		
	4P	1.55					2.5(TM/M); 2.65(EN/EM)					5.8(TM/M); 7.8(EN/EM)					6.0(TM/M); 8.0(EN/EM)					13.5(TM/M); 13.5(EN/EM)					17.5(20)[4]		

Note: [1] For 1 pole product only;

[2] The operating temperature of basic (dial code) electronic type is -35° C~+70° C, and the operating temperature of standard (liquid crystal) electronic type is -25° C~+70° C;

[3] For 3/4 pole product only;

[4] The data in "()" is for motor type.

B

NM8N DC Moulded Case Circuit Breaker		125					250					400					630					800					1600	
Rated current(A)		16-20-25-32-40-50-63-80-100-125					125-160-180-200-225-250					250-315-350-400					400-500					500-630-700-800					800-1000-1250-1600	
Electric characteristics																												
Rated insulation voltage Ui (V)		1000					1000					1000					1000					1250					1000	
Rated impulse withstand voltage Uimp (kV)		8					8					12					12					12					8	
Rated operational voltageUe(V),DC		250, 500, 750, 1000					250, 500, 750, 1000					750, 1000					750, 1000					750, 1000					750, 1000	
Breaking capacity code		B	C	S	Q	H	B	C	S	Q	H	B	C	S	Q	H	B	C	S	Q	H	B	C	S	Q	H	B	C
Number of poles	1P	■	■	■	—	—	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2P	■	■	■	■	■	■	■	■	■	■	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	3P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	4P	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rated ultimate short-circuit breaking capacity Icu(kA)	DC250V 1P	25	36	50	—	—	25	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC500V 2P in series	25	36	50	70	100	25	36	50	70	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC750V 3P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
	DC1000V 4P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
Rated service breaking capacity Ics(kA)	DC250V 1P	25	36	50	—	—	25	36	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC500V 2P in series	25	36	50	70	100	25	36	50	70	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	DC750V 3P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
	DC1000V 4P in series	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36	50	70	100	25	36
Standard		IEC/EN 60947-2, GB/T 14048.2										IEC/EN 60947-2, GB/T 14048.2																
Utilization category		A					A					A					A					A					A	
Ambient temperature		-40℃ ~+70℃										-40℃ ~+70℃																
Safety of insulation		■					■					■					■					■					■	
Arcing distance		0					0					0					0					0					0	
Mechanical life (CO recycle)	Maintenance free	15000					15000					15000					15000					10000					6000	
Electrical life (CO recycle)	DC1000V,In	2000					1500					1500					1500					1000					1000	
Release units																												
Distribution protection	TM	■					■					■					■					■					■	
Mounting and connection																												
Fixed	Front connection	■					■					■					■					—					■	
	Rear connection	■					■					■					■					■					—	
Plug-in[1]	Front connection	■					■					■					■					—					—	
	Rear connection	■					■					■					■					—					—	
Draw-out[1]	Front connection	—					—					■					■					■					—	
	Rear connection	—					—					■					■					■					—	
DIN rail	Front connection	■					■					—					—					—					—	
Dimension																												
Dimension (mm) W×H×D	Width (1P/2P/3P/4P)	35/62/90/120					40/70/105/140					140/185					140/185					195/260					210/280	
	Height	140					157					255					255					300					286	
	Depth	78.5					88.7					113					113					133					167	
Weight																												
Weight(kg)/Fixed	1P	0.5					0.75					—					—					—					—	
	2P	0.83					1.3					—					—					—					—	
	3P	1.19					1.85					5.2					5.5					10.3					13.5	
	4P	1.55					2.5					6.7					7					13.5					17.5	

Note: [1] For 3/4 pole product only.

B

NM8NL Residual Current protection module		125	250	400	630
Rated current(A)		125	250	400	630
Number of poles		3P、4P	3P、4P	3P、4P	3P、4P
Electric characteristics					
Rated insulation voltage Ui (V)		1000	1000	1000	1000
Rated impulse withstand voltage Uimp (kV)		8	8	12	12
Rated operational voltageUe(V),AC 50/60Hz		380/400/415、440	380/400/415、440	380/400/415、440	380/400/415、440
Rated current (A) of circuit breaker	TM	16-20-25-32-40-50-63-80-100-125	125-160-180-200-225-250	250-315-350-400A	400-500A
	of circuit breaker	—	32-63-100-160-250	250-400	400-630
	EM	—	32-63-100-160-250	250-400	400-630
	M	16-20-25-32-40-50-63-80-100-125	125-160-180-200-225-250	250-315-350-400A	400-500A
	ENM	—	32-63-100-160-250	250-400	400-630
	EMM	—	32-63-100-160-250	250-400	400-630
Rated residual operating current IΔn(A)	RCD1 (Four-gear adjusable)	0.03-0.1-0.3-1	0.03-0.1-0.3-1	0.03-0.1-0.3-1	0.03-0.1-0.3-1
	RCD2 (Four-gear adjusable)	0.05-0.2-0.5-2	0.05-0.2-0.5-2	—	—
	RCD3 (Four-gear adjusable)	—	—	0.05-0.2-0.5-1	0.05-0.2-0.5-1
	RCD4 (Four-gear adjusable)	—	—	0.1-0.3-1-2	0.1-0.3-1-2
Rated residual non-operating current IΔno(A)		0.5IΔn	0.5IΔn	0.5IΔn	0.5IΔn
Limit non-actuating time (ms)[1]		Δt : 0-60-200-500			
Maximum breaking time (ms)	Total breaking time (adjustable)	100-300-500-1000	100-300-500-1000	100-300-500-1000	100-300-500-1000
Rated residual making and breaking capacity IΔm(kA)		0.25Icu	0.25Icu	0.25Icu	0.25Icu
Leakage alarm non-tripping function		□	□	□	□
Standard		IEC/EN 60947-2，GB/T 14048.2			
Residual current type		A/AC	A/AC	A/AC	A/AC
Safety of insulation		■	■	■	■
Ambient temperature		-25℃～+70℃			
Arcing distance		0	0	0	0
Dimension					
Dimension with circuit breaker (mm) W×H×D	Width（3P/4P）	90/120	105/140	140/185	140/185
	Height	205	232	355	355
	Depth	78.5	88	113	113
Weight					
Weight of residual current protection module (kg)	3P	0.43	0.84	1.98	1.98
	4P	0.51	1.08	2.69	2.69

Note: [1] When the residual operating current is set to 0.03A, the limit non-actuating time must be set to 0.

NM8NSD Switch Disconnector		125	250	400	800	1600
NM8NSD Switch Disconnector Ith(A),40℃		125	250	400	800	1600
Number of poles		2P 3P 4P	2P 3P 4P	3P 4P	3P 4P	3P 4P
Rated operational current Ie(A)		125	250	400	800	800-1000-1250-1600
Rated operational voltage Ue(V)	AC (50/60Hz)	690	690	690	690	415/690
	DC	500 750 1000	500 750 1000	750 1000	750 1000	750 1500
Rated insulation voltage Ui (V)		1000	1000	1000	1250	AC : 1000 DC : 1500
Rated impulse withstand voltage Uimp (kV)		8	8	12	12	12
额定短路接通能力 Icm(kA)		3.2(AC)/2(DC)	5(AC)/3.2(DC)	8(AC)/5(DC)	14	40(AC)/19.2(DC)
Rated short-time withstand current Icw(kA)	1s	2	3.2	5	8/10	20(AC)/19.2(DC)
	3s	2	3.2	5	8/10	20
Standard		IEC/EN 60947-3，GB/T 14048.3				
Utilization category		AC-22A/AC-23A DC-22A/DC-23A	AC-22A/AC-23A DC-22A/DC-23A	AC-22A/AC-23A DC-22A/DC-23A	AC-22A/AC-23A DC-22A/DC-23A	AC-22A/AC-23A DC-22A/DC-22B
Safety of insulation		■	■	■	■	■
Ambient temperature		-40℃～+70℃				
Arcing distance		0	0	0	0	0
Mechanical life (CO recycle)	Maintenance free	15000	15000	15000	10000	6000
Electrical life (CO recycle)	AC415V,In	8000	6000	4000	2000	1000
	AC690V,In	2000	1500	1500	1000	1000
	DC1000V,In	2000	1500	1500	1000	1000
Mounting and connection						
Fixed	Front connection	■	■	■	—	■
	Rear connection	■	■	■	■	■
Plug-in[1]	Front connection	■	■	■	—	—
	Rear connection	■	■	■	—	—
Draw-out[1]	Front connection	—	—	■	■	—
	Rear connection	—	—	■	■	—
DIN rail	Front connection	■	■	—	—	—
Dimension						
Dimension(mm) W×H×D	Width (2P/3P/4P)	62/90/120	70/105/140	140/185	195/260	210/280
	Height	140	157	255	300	286
	Depth	78.5	88	113	133	167 (195) [2]
Weight						
Weight(kg)/Fixed	2P	0.81	1.1	—	—	—
	3P	1.05	1.75	5	9.5	13(15.5)[2]
	4P	1.5	2.4	5.5	12.5	17(19.5)[2]

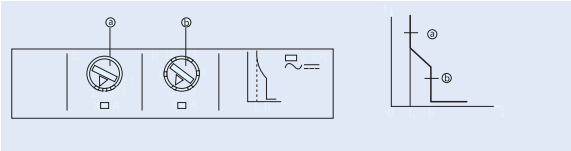
Note: [1] For 3/4 pole product only;
[2] The data in "()" is for motor type

5 Release

5.1 Protection for power distribution

5.1.1 Thermo-magnetic type release

Thermo-magnetic release of NM8N-125, 250, 400, 630, 800 and 1600 breakers can be set to meet protection requirements



Thermo-magnetic release	125		250			400	630	800	1600
Number of poles	1P	2P/3P 4P	1P	2P/3P/4P		3P/4P	3P/4P	3P/4P	3P/4P
Rated curent	16/20/25 32/40/50 63/80/100/125		125/160 180/200 225/250	125	160/180 200/225 250	250/315 350/400	400/500	500/630 700/800	800/1000 1250/1600
Over-load protection									
Setting current (A) $I_r=I_n\times$	1.0 Do not adjust	0.7-0.8-0.9-1.0	1.0 Do not adjust	0.7-0.8-0.9-1.0					0.8-0.9-1.0
Short-circuit instantaneous protection									
Setting current (A) $I_i=I_n\times$	10		10	7-8-9-10-11-12	5-6-7-8-9-10				
Accuracy	±20%								
N-pole protection									
Setting current (A) $I_{tN}=I_n\times$	/	10	/	The same with the other three-phase poles.					
Accuracy	±20%								

5.1.2 Basic electronic type release for power distribution

EN electronic trip unit has three-stage protection of overload, short circuit short time-delay and short circuit instantaneous protection.

Electronic type		250	400	630	800	1600
Over-load protection	Setting current $I_r=I_n\times$	0.4-0.5-0.6-0.7-0.8-0.9-0.95-1.0				
	6I, Tripping time Tr(s)	3-6-12-18, Accuracy ±10%				
Short circuit short-time delay protection	Setting current $I_{sd}=I_r\times$	1.5-2-3-4-6-8-10, OFF, Accuracy ±15%				
	Tripping time T_{sd}(s)	0.1-0.2-0.3-0.4, Accuracy ±20% or ±40ms(higher value will be selected)				
Short circuit instantaneous protection	Setting current $I_i=I_n\times$	2-3-4-6-8-10-12, OFF, Accuracy ±15%				
	Max. tripping time (ms)	60				
N pole protection	Setting current	I_{tN}=(0.5,1)xI_n; OFF; I_{sdN}=(1.5-2-3-4-6-8-10)I_{tN} I_{tN}=(2-3-4-6-8-10-12)I_{tN}				
	Tripping time (s)	The same with the other three-phase poles.				

- Overload protection and tripping time setting

—The current value I_r can be adjusted according to the user's needs. The tripping time T_r is at the status of 6I_r

- Short circuit short-time delay protection and trip time setting

—The current value I_{sd} can be adjusted according to the user's needs. Tripping time T_{sd} is the short-circuit short time-delay tripping time, which can be adjusted according to user needs.

- Short circuit instantaneous protection characteristics setting

—The current value I_i can be adjusted according to the user's needs.

- Neutral line protection feature setting

The four-pole circuit breaker N-pole protection current value can be adjusted according to user needs. The N pole tripping time is the same with the other three-phase poles.

5.1.3 Standard electronic type release for power distribution

EM release has four-stage protection of overload, short circuit short-time delay, short circuit instantaneous protection and earth fault, with real-time current display, protection parameter information display, fault information display and parameter setting function

Electronic type		250	400	630	800	1600
Over-load protection	Setting current $I_r=I_n\times$	0.4~1.0, Stepping1A				
	6I, Tripping time T_r(s)	3~18, 1s, Accuracy ±10%				
Short circuit short-time delay protection	Setting current $I_{sd}=I_r\times$	1.5~10, Stepping1A, OFF, Accuracy ±15%				
	Tripping time T_{sd}(s)	0.1-0.2-0.3-0.4, Accuracy ±20% or ±40ms(higher value will be selected)				
Short circuit instantaneous protection	Setting current $I_i=I_n\times$	1.5~12, Stepping1A, OFF, Accuracy ±15%				
	Max. tripping time (ms)	60				
Earth fault protection	Setting current $I_g=I_n\times$	0.4-0.5-0.6-0.7-0.8-0.9-1.0, OFF, Accuracy ±15%				
	Tripping time (s)	0.1-0.2-0.3-0.4,Accuracy ±15%				
N pole protection	Setting current	I_{tN}=(0.5,1)xI_n; I_{sdN}=(1.5~10)I_{tN}; I_{tN}=(1.5~12)I_{tN}; 可 OFF				
	Tripping time (s)	The same with the other three-phase poles.				

- Overload protection and tripping time setting

— Current setting value I_r , the user can adjust the range according to the ↑ and ↓ buttons on the panel, the range is (0.4~1.0) I_n, and the tripping time T_r is at the status of 6I_r, which can be adjusted according to user needs.

- Short circuit short-time delay protection and tripping time setting

—The current setting value Isd can be adjusted according to the user's needs, and the "OFF" indicates function can be turned off. Tripping time T_{sd} is the short-circuit short-time delay tripping time, which can be adjusted according to user needs.

- Short circuit instantaneous protection characteristics setting

—The current setting value I_i can be adjusted according to the user's needs, and the "OFF" indicates function can be turned off.

- Neutral line protection feature setting

—Neutral line protection of the four-pole circuit breaker (current setting value I_{tN}), the setting range is 0.5I_n , 1I n or OFF, which can be adjusted according to the user's needs. The "OFF" position indicates that the N pole has no protection function.

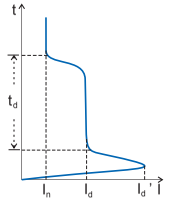
- Earth fault protection

Earth fault I_g can be adjusted according to user needs, where the "OFF" means the function can be turned off.

5.2 Protection for motor

5.2.1 Motor starting characteristics

At present, most of the motors use three-phase asynchronous induction motors, and a large part of them use the direct start mode, namely, the electric energy does not take artificial restriction measures, and directly feeds to start the motor, which is also called full-pressure start. When the asynchronous motor is directly started, a high starting current of 4 to 7 times of the rated current occurs. The reason why the asynchronous motor has a large starting current is that the motor has certain inertia, and the rotor speed cannot be immediately changed to the rated speed after starting. At this time, the relative rotational speed of the rotating magnetic field of the stator (synchronous speed of the motor, slightly higher than the rated speed) is large. The rotor winding cuts the stator magnetic field at a large speed to generate a large current; at the same time, the magnetic field generated by the large current of the rotor in turn induces the stator winding, so that the current also rapidly increases.



Motor starting Current curve

Startup parameter

Rated current (I_n): current value of the motor under rated operation

Starting current (I_d): The current when the motor starts, its magnitude varies with different conditions, the average value is 7.2×In

Start peak current (I_d'): Transient current during the first two half-waves after the motor is powered on, typically 14 × I_n

Start-up time (t_d): generally 0.5~20s, which refers to the time when the motor has starting current

Direct startup impact on the protection device

For circuit breakers with magnetic protection, if the conventional current of the magnetic trip unit is set incorrectly, the circuit breaker will mistake the start current of the motor for short-circuit current, causing the circuit breaker to malfunction. For the independent thermal relay, the heat generated by the large starting current during the motor starting phase will also cause the relay to trip. For the contactor, if the motor needs electric or regenerative braking, it needs to be able to be broken during the motor starting phase. It generally needs to derate, in order to avoid the malfunction of the protection device caused by the start current:

The inverse time characteristic curve of the independent thermal relay is required to be completely above the starting current.

The short-circuit current trip setting of the circuit breaker with magnetic protection should be greater than the peak starting current of the motor.

5.2.2 Protection solution

The NM8N Series offers start-up, control and protection solutions for two three-phase asynchronous motors:

Three-component solution

Electromagnetic protection circuit breaker + contactor + thermal relay

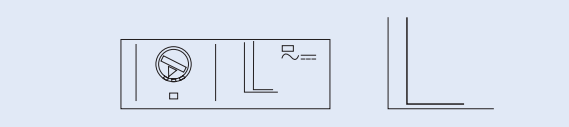
Among them, the electromagnetic protection circuit breaker is used for short circuit protection, the

B

contactor is used for motor operation, and the thermal relay is used for overload, phase loss and phase unbalance protection.

1) Magnetic release

The electromagnetic protection circuit breaker has a current range of 125~800A, an adjustable range of 9~14In and an accuracy of 20%. It is especially suitable for use in the classic three-component protection solution.



Magnetic	125	250	400	630	800
Pole	3P/4P	3P/4P	3P/4P	3P/4P	3P/4P
Short circuit instantaneous protection					
Setting current (A) $I_r=I_n$x	12	9-10-11-12-13-14			
Accuracy	±20%				
N pole protection					
Setting current (A) $I_{rN}=I_n$x	12	The same with the other three-phase poles.I_r			
Accuracy	±20%				

Two-component solution

Integrated protection electronic circuit breaker + contactor

In the two-component solution, there is no need to use the thermal relay, and the integrated protection electronic circuit breaker has the functions of overload, phase loss, phase unbalance protection and short circuit protection. The integrated protection electronic circuit breaker not only has high tripping precision, but also has reliable operation. The two-component solution consisting of contactors and the installation time can be saved without being affected by the ambient temperature.

2) Integrated protection: Basic electronic type release for motor protection

The ENM electronic trip unit allows for tighter tolerance trip times, as detailed in the table below.

Electronic type		250	400	630	800
Overload protection	Setting current $I_r=I_n$ ×	0.4-0.5-0.6-0.7-0.8-0.9-1.0, OFF			
	7.2I_r Tripping time T_r(s)	4、8、16, Accuracy ±10%	48、16、24, Accuracy ±10%		
	Tripping level	5、10、20	5、10、20、30		
Short circuit short-time delay protection	Setting current $I_{sd}=I_r$×	5-6-8-9-10-11-12, OFF, Accuracy ±15%			
	Tripping time T_{sd}(ms)	100,Accuracy ±40			
Short circuit instantaneous protection	Setting current $I_i=I_{in}$×	15[1]			
	Max. tripping time (ms)	60			
Phase unbalance/Phase failure I_{unbal}		30%-40%-50%-60%-70%-80%-90% (Phase failure)-OFF			
Max. trip time of phase imbalance (s)		4-6-8-10,Accuracy ±10%			
Tripping time of phase failure (s)		0.25,Accuracy ±20%			
N pole protection	Setting current	I_{rN}=(0.5,1)xIn;I_{sdN}=(5-6-8-9-10-11-12)I_{rN} I_{iN}=15I_{rN}, OFF			
	Tripping time	The same with the other three-phase poles			

Note: [1] Setting current I_{sd}<I_i(within tolerance).

3) Integrated protection: Standard electronic type release for motor protection

The EMM electronic release not only has the protection function of the ENM release, but also adds ground fault protection and stall protection. Moreover, it can also display real-time current, display protection parameter information, display fault information, and have parameter setting function.

Electronic type		250	400	630	800
Overload protection	Protection current $I_r=I_n$×	0.4~1.0, Stepping1A, OFF			
	7.2I_r Tripping time T_r(s)	4、8、16, Accuracy±10%	4、8、16、24, Accuracy ±10%		
	Tripping level	5、10、20	5、10、20、30		
Short circuit short-time delay protection	Protection current $I_{sd}=I_r$×	4~12, Stepping1A, OFF, Accuracy ±15%			
	Tripping time T_{sd}(ms)	100, Accuracy ±40			
Short circuit instantaneous protection	Protection current $I_i=I_n$×	15[1]			
	Max. tripping time(ms)	60			
Earth fault protection	Protection current $I_g=I_n$×	0.4-0.5-0.6-0.7-0.8-0.9-1.0, OFF, Accuracy ±15%			
	Tripping time (s)	0.1-0.2-0.3-0.4, Accuracy ±20% or 40ms(higher value will be selected)			
Phase unbalance/Phase failure I_{unbal}		30%-40%-50%-60%-70%-80%-90%(Phase failure)-OFF			
Max. trip time of phase imbalance (s)		4-6-8-10, Accuracy ±10%			
Tripping time of phase failure (s)		0.25, Accuracy ±20%			
Locked-rotor current I_{jam}		(3~10)I_r, Stepping1A, OFF(Defalut), Accuracy ±15%			
Tripping timeT_{jam}(s)		1~30, Step size1s, Defalut 5, Accuracy ±10%			
N pole protection	Setting current	I_{rN}=(0.5,1)xI_{rn} OFF; I_{sdN}=(4~12)I_{rN}; I_{iN}=15I_{rN}, OFF			
	Tripping time	The same with the other three-phase poles.			

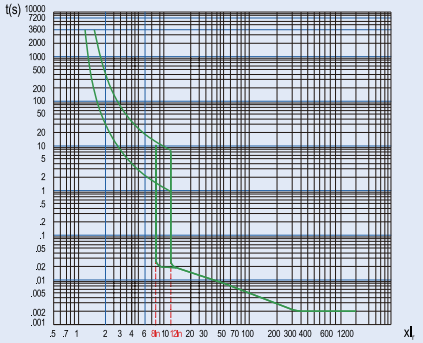
Note: [1] Setting current I_{sd}<I_i(within tolerance).

B

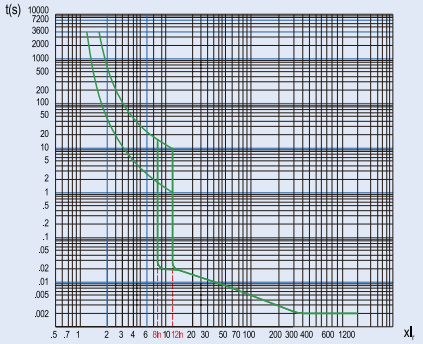
6 Tripping curve

6.1 Thermal-magnetic type for power distribution

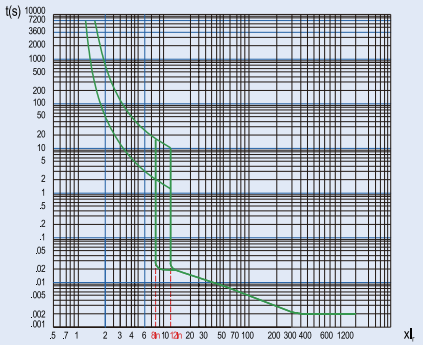
NM8N-125(16A,20A,25A,32A)



NM8N-125(40A,50A,63A)

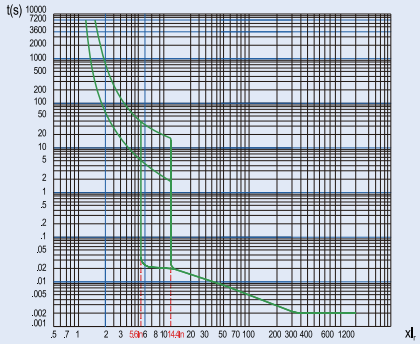


NM8N-125(80A,100A,125A)

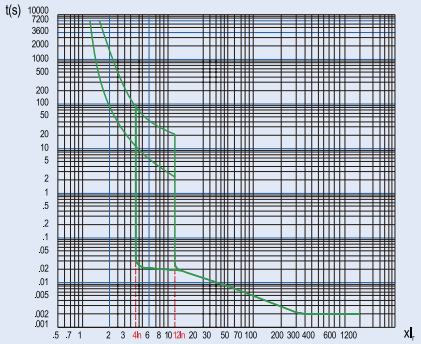


B

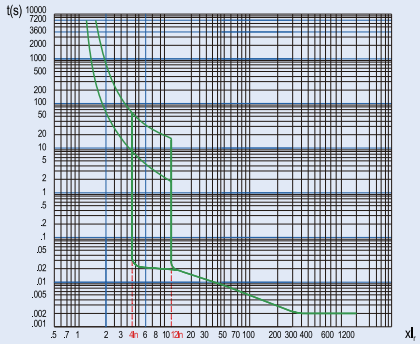
NM8N-250(125A)



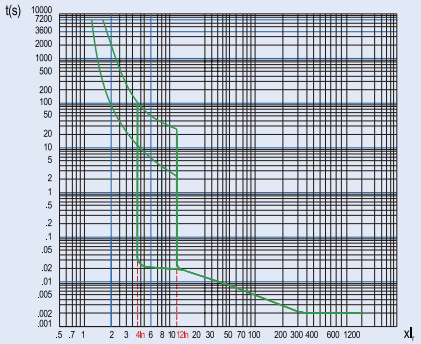
NM8N-400(250A~400A)



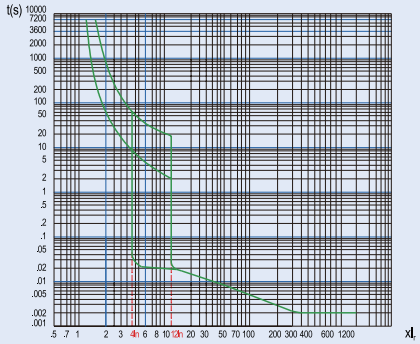
NM8N-250(160A,180A)



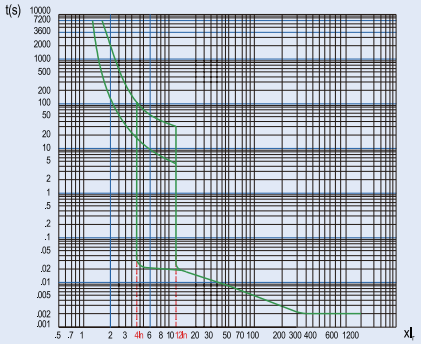
NM8N-630(400A~500A)



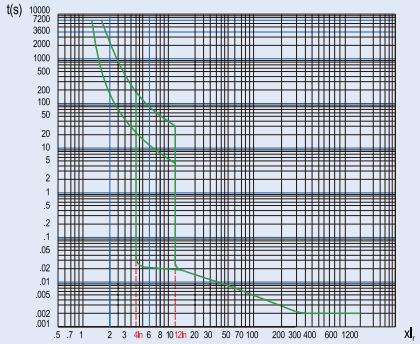
NM8N-250(200A,225A,250A)



NM8N-800(500A~800A)

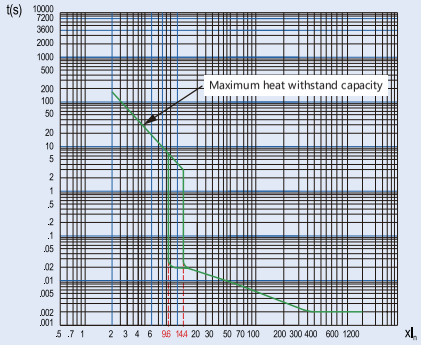


NM8N-1600(800A~1600A)

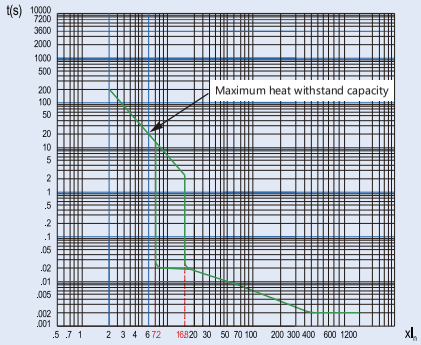


6.2 Magnetic type for motor protection

NM8N-125(16A~125A)

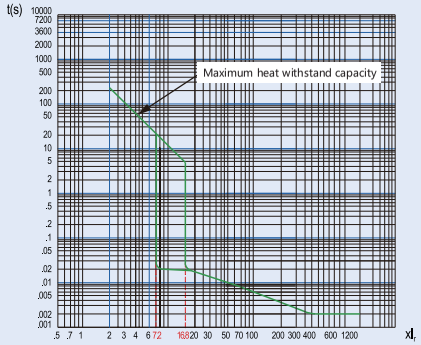


NM8N-250(125A~250A)

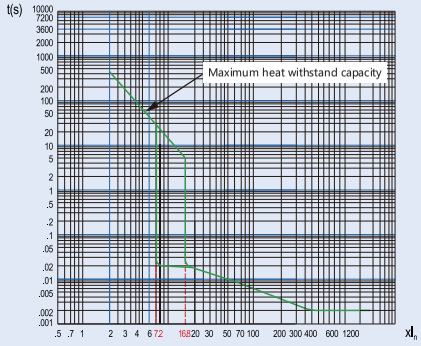


B

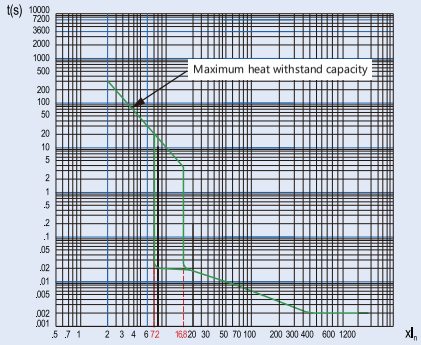
NM8N-400(250A~400A)



NM8N-630(400A~500A)



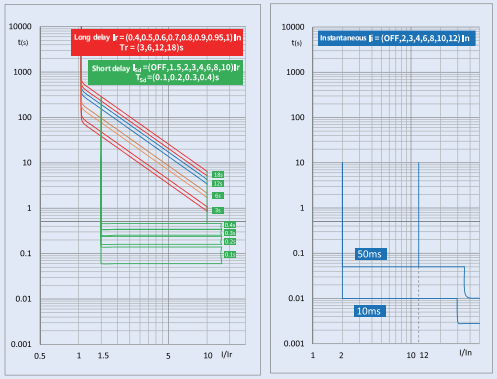
NM8N-800(500A~800A)



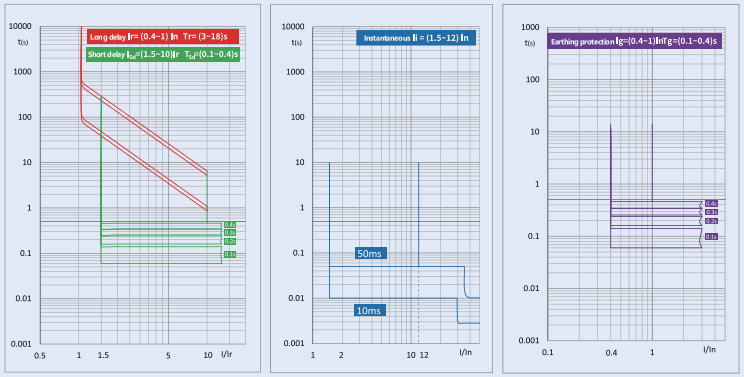
B

6.3 Electronic type for power distribution

EM Basic electronic type

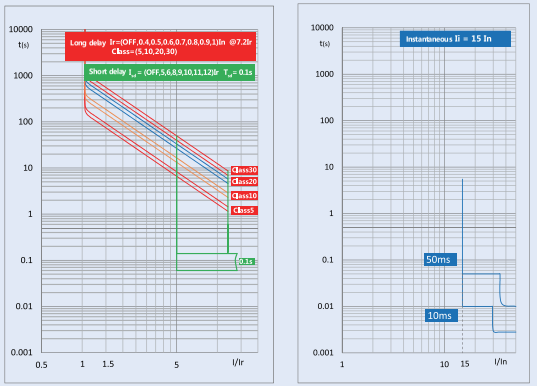


EM Standard electronic type



6.4 Electronic type for motor protection

ENM Basic electronic type



EMM Standard electronic type