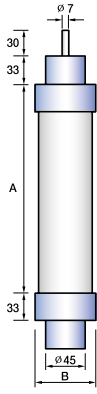
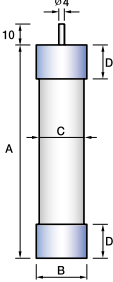
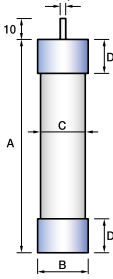


Selection tables

DIN type	Application Model	Fuse link				Fuse selection by load		
		Rated voltage (kV)	Rated current (A)	Rated interrupting current (kA)	Lowest interrupting current (A)	Transformer load(kVA)		Capacitive load(kVA)
						Single phase	Three phase	Three phase
	LFL - 3/6G - 5B	3.6 (7.2)	5	40	4in	4 ~ 8 * (8 ~ 16)	6.7 ~ 14 * (13 ~ 28)	9.8up to * (9.8up to)
	LFL - 3/6G - 10B		10			6 ~ 13 (13 ~ 25)	11 ~ 22 (21 ~ 44)	9.8 ~ 12 (19 ~ 24)
	LFL - 3/6G - 20B		20			15 ~ 31 (30 ~ 62)	25 ~ 53 (51 ~ 107)	12 ~ 31 (24 ~ 61)
	LFL - 3/6G - 30B		30			21 ~ 42 (40 ~ 84)	35 ~ 73 (70 ~ 145)	31 ~ 46 (61 ~ 92)
	LFL - 3/6G - 40B		40			40 ~ 82 (80 ~ 165)	69 ~ 143 (137 ~ 286)	46 ~ 64 (92 ~ 128)
	LFL - 3/6G - 50B		50			49 ~ 102 (98 ~ 204)	85 ~ 117 (170 ~ 354)	64 ~ 81 (128 ~ 163)
	LFL - 3/6G - 60B		63			66 ~ 137 (132 ~ 275)	114 ~ 238 (229 ~ 476)	181 ~ 105 (163 ~ 210)
	LFL - 3/6G - 75B		75			68 ~ 165 (134 ~ 330)	117 ~ 285 (233 ~ 571)	105 ~ 150 (210 ~ 300)
	LFL - 3/6G - 100B		100			128 ~ 220 (256 ~ 440)	222 ~ 381 (443 ~ 762)	150 ~ 222 (300 ~ 445)
	LFL - 3/6G - 125B		125			151 ~ 275 (302 ~ 550)	261 ~ 476 (522 ~ 952)	222 ~ 275 (445 ~ 550)
	LFL - 3G - 160B	3.6	160	211 ~ 352 (-)	365 ~ 610 (-)	275 ~ 370 (-)		
	LFL - 3G - 200B		200	265 ~ 440 (-)	495 ~ 762 (-)	370 ~ 550 (-)		
	LFL - 6G - 160B	7.2	160	-	(425 ~ 704)	(735 ~ 1,220)	(550 ~ 742)	
	LFL - 6G - 200B		200	-	(437 ~ 880)	* (755 ~ 1,520)	(742 ~ 1,000)	
	LFL - 20G - 5B	24	5	25	5in	20 ~ 43	36 ~ 75	46up to
	LFL - 20G - 10B		10			43 ~ 90	75 ~ 157	46 ~ 83
	LFL - 20G - 20B		20			99 ~ 206	172 ~ 358	83 ~ 203
	LFL - 20G - 30B		30			149 ~ 310	258 ~ 538	203 ~ 317
	LFL - 20G - 40B		40			267 ~ 557	464 ~ 965	317 ~ 425
	LFL - 20G - 50B		50			345 ~ 719	598 ~ 1,246	425 ~ 564
	LFL - 20G - 60B		60			430 ~ 897	745 ~ 1,554	564 ~ 710
	LFL - 20G - 75C		75			580 ~ 1,145	1,000 ~ 1,983	710 ~ 1,021
	LFL - 20G - 100C		100			923 ~ 1,527	1,600 ~ 2,645	1,021 ~ 1,655
	LFL - 20G - 125B		125			1,364 ~ 1,908	2,362 ~ 3,304	1,655 ~ 2,370
LFL - 20G - 160B	160	2,125 ~ 2,443	3,680 ~ 4,232	2,370 ~ 3,170				
LFL - 20G - 200B	200	2,650 ~ 3,050	4,593 ~ 5,287	3,170 ~ 4,000				

KS type	Application Model	Fuse link				Fuse selection by load		
		Rated voltage (kV)	Rated current (A)	Rated interrupting current (kA)	Lowest interrupting current (A)	Transformer load(kVA)		Capacitive load(kVA)
						Single phase	Three phase	Three phase
G(General use) type 	LFL - 3/6G - 5	3.6 (7.2)	5	40	5in	- * (5up to)	5up to * (15up to)	- * (-)
	LFL - 3/6G - 10		10			10up to (15up to)	15up to (30up to)	10up to (25up to)
	LFL - 3/6G - 20		20			20up to (50up to)	30up to (75up to)	30up to (50up to)
	LFL - 3/6G - 30		30			30up to (75up to)	75up to (150up to)	50up to (100up to)
	LFL - 3/6G - 40		40			50up to (100up to)	100up to (200up to)	75up to (150up to)
	LFL - 3/6G - 50		50			75up to (150up to)	150up to (300up to)	100up to (200up to)
	LFL - 3/6G - 60		63			- (-)	- (-)	- (-)
	LFL - 3/6G - 75		75			150up to (200up to)	200up to (400up to)	200up to (400up to)
	LFL - 3/6G - 100		100			200up to (400up to)	375up to (750up to)	300up to (600up to)
	LFL - 3G - 150		150			300up to (-)	500up to (-)	400up to (-)
	LFL - 3G - 200	200	400up to (-)	750up to (-)	600up to (-)			
	LFL - 3G - 300	300	625up to (-)	1,000up to (-)	1,000up to (-)			
	LFL - 3G - 400	400	750up to (-)	1,500up to (-)	- (-)			
	LFL - 6G - 150	150	- (500up to)	- (1,000up to)	- (800up to)			
	LFL - 6G - 200	200	- (750up to)	- (1,500up to)	- (1,200up to)			
	LFL - 6G - 300	300	- (1,250up to)	- (2,000up to)	- (-)			
	LFL - 6G - 400	400	- (-)	- (2,500up to)	- (-)			
	M(Motor protection) type 	LFL - 3M - 20	3.6	20	40	7in	-	50up to * (-)
LFL - 3M - 50		50		-			150up to (-)	
LFL - 3M - 100		100		-			300up to (-)	
LFL - 3M - 150		150		-			400up to (-)	
LFL - 3M - 200		200		-			800up to (-)	
LFL - 3M - 300		300		-			1,000up to (-)	
LFL - 3M - 400		400		-			- (-)	
LFL - 6M - 20		20		-			- (100up to)	
LFL - 6M - 50		50		-			- (300up to)	
LFL - 6M - 100		100		-			- (600up to)	
LFL - 6M - 150		150	-	- (800up to)				
LFL - 6M - 200		200	-	- (-)				
LFL - 6M - 300		300	-	- (-)				
LFL - 6M - 400		400	-	- (-)				

Fuse selection by load	Dimensions(mm)				Applicable holder	
Motor load(kVA)	A	B	C	D		
Three phase						
6.5 ~ 10.7 * (13 ~ 22)	195	55	-	-	LFH-6G-D1HB	
10.7 ~ 28 (22 ~ 36)						
28 ~ 57 (36 ~ 86)						
50 ~ 85 (86 ~ 117)						
85 ~ 115 (117 ~ 230)						
115 ~ 142 (230 ~ 284)						
138 ~ 191 (276 ~ 382)	192	77	-	-		
181 ~ 252 (362 ~ 503)						
253 ~ 369 (469 ~ 739)						
293 ~ 435 (556 ~ 870)						
343 ~ 572 (-)	292	77	-	-	LFH-6G-D2HB	
375 ~ 630 (-)						
- (751 ~ 1,223)						
- (1,154 ~ 1,760)						
-	442	55	-	-		
-						
-						
-						
-	442	77	-	-		LFH-20G-D2HB
-						
-						
-						
-	442	87	-	-		
-						
-						
-						

Fuse selection by load	Dimensions(mm)				Applicable holder	
Motor load(kW)	A	B	C	D		
Three phase						
-	261	50	47	25	LFH-6G-D60	
-						
-						
-						
-						
-						
-	311	60	57	30		
-						
-						
-						
-	311	77	73	43	LFH-6G-D2H	
-						
-						
-						
-	350	110	108	55		
-						
-						
-						
37 ~ 75 * (-)	200	60	58	30		LFH-3M-100
90 ~ 200 (-)						
220 ~ 400 (-)						
450 ~ 630 (-)						
710 ~ 800 (-)						
900 ~ 1250 (-)	200	77	73	43		
1,500 (-)						
- (75 ~ 160)						
- (185 ~ 400)						
- (450 ~ 800)	311	60	58	30	LFH-6M-50	
- (900 ~ 1,250)						
- (1,500)						
- (2,500)						
- (3,000)	350	77	73	43		
-						
-						
-						
-	450	87	84	50		LFH-6M-200
-						
-						
-						
-	450	87	84	50	LFH-6M-400	
-						
-						
-						

Selecting conditions and warning

- * The values in () apply to the loads of 7.2kV.
- It is assumed that the inrush current of a transformer is 10 times of the full load current of a motor for 0.1 second.
 - The rated current of a fuse is selected to carry continuously the current of 1.5 times of rated current of a transformer. (1.3 times in the case of *)
 - In the transformer load table it is assumed that the interruption will be made at 25 times of rated current within 2 seconds.
- It is assumed that the inrush current of a motor is 5 times of full load current for 10 seconds.
- In the case of using the M(motor protection) type fuses for the purpose of the short-circuit protection of a motor or a starter select the proper rating in addition refer to the characteristic curves on the catalog to make the device protected from overload by a circuit breaker or a contactor.
- It is assumed that the inrush current of a capacitor is 71 times of its rated current for 0.002 second.
 - The rated current of a fuse is selected to carry continuously the current of 1.43 times of rated current of a capacitor.
 - In case service life of more than 1000 operations is required select in the M(motor protection) type fuse table.
- The above mentioned comments are according to KS(Korean Industrial Standard) and subject to the real situation.



DIN-Type fuse

Power fuse

Power fuse

LS Prime-MEC power fuses are designed to protect equipments from fault current such as short-circuit, and generally used for the protection the circuits of transformers, capacitors and motors they protect.

For further safety and reliability the elements inside of fuses are made of silver, and high quality quartzs and and ceramic are used for magnetic rods and tubes, respectively.

LS medium voltage vacuum contactors using LS vacuum interrupters manufactured with worldclass technology are type tested in LS PT & T that is accredited high power test lab by worldclass KOLAS. To ensure the performance they, installed in a vacuum contactor, are tested according to IEC 60282-1 in LS PT & T that is accredited high power test lab by worldclass KOLAS.

Considerations in application

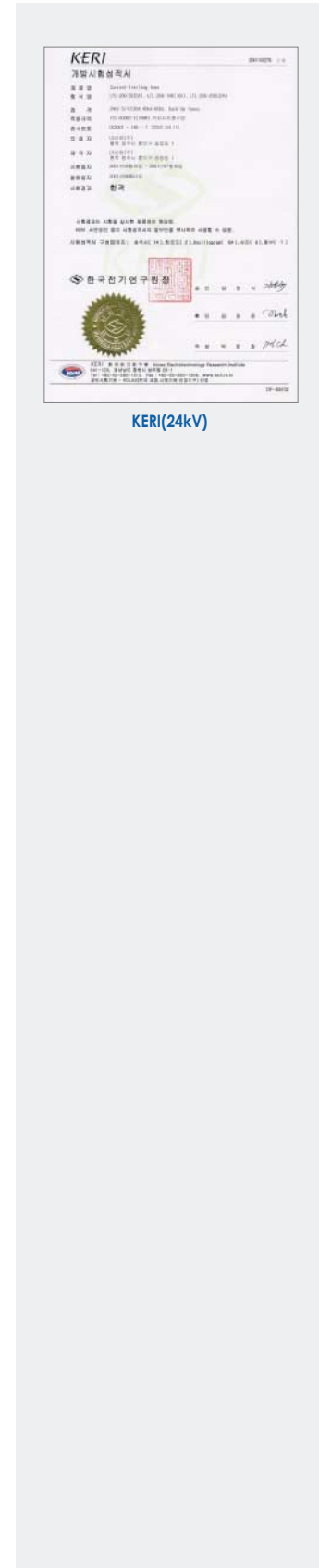
- Power fuses are suitable for the protection from a short-circuit, Overload current will not protected.
- Reset or re-use after blowing is not possible. Fuse reset or re-use is not possible after fused are blown out.
- When the fuses are selected, the inrush currents arising from the starting transformers, motors, capacitors should be considered.
- When the fuses are selected, their usage and circuit requirements should be considered.
- For the purpose of protection from the fault current below the lowest interrupting current of the fuse it is desirable to replace it with a fuse having lower interrupting rate or add other overcurrent relay in series
- Withstand voltage of the circuit should be higher than that of a fuse that protects it.
- If possible, select the fuse whose rated current is much higher than the load current. The rated current not sufficiently exceeding the normal current of the load may cause reduction in the service life.
- Replace all three fuses in case of blowing in a fuse.

Determination of the rated current

The rated current of the fuse must be selected properly after examination of the current/time characteristics of fuses, equipments and the related circuit conditions.

General considerations

- When the fuses are selected the sufficient rated current should be considered to avoid the deterioration of the fuse element due to sustained load current in the long term.
- The fuse rated current should be higher than the sum of all load currents.
- The estimated overload current should be within the fuse's time/current characteristics. The estimated overload current should not exceed the allowable overload withstand currents of the equipment and the number of its events should not exceed 100 times.
- The characteristic curve of a fuse must lie to the right of those of other equipments to be protected.
- The withstand strength such as permissible let-through current, I^2t of the equipments to be protected must be higher than that of a fuse.
- Coordination of permissible time limit
Protection equipments in the line side < Fuses < Protection equipments in the load side
- Coordination when fuses are used as back-up protection
Permissible let-through current of a fuse < That of a protection equipment
- Use the same rating for all three phases even the differential current between phases exists.



Considerations by the type of load

1. Power fuses for transformer loads

- The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
 - The fuse's current/time characteristic should cover the inrush current/time of the transformer.
 - In case of power transformers the symmetrical inrush current must be within 10 times of the fuse rating and the fuse should withstand at least 0.1 second under the condition.
 - Fuse rated current \geq Transformer rated current
 - The lowest interrupting current of the fuse $<$ Short circuit current in the primary of the fuse
 - In case of protection of two or more transformers
 - Fuse rating should be selected on the basis of the phase condition where maximum current flows.
 - In the event of short-circuit in the secondary of the transformer
The lowest interrupting current of the fuse $<$ Short circuit current in the primary of the transformer
 - In case of potential transformers
 - When the fuses are selected do not consider the short-circuit happening in the secondary of the PT, but protecting PT itself and the circuit against the fault in the primary side.
 - Select the fuse with higher rated current than the load current so as not to be damaged by overcurrent.
 - The characteristic curve of a fuse must lie to the right of those of other equipments to be protected.
 - The withstand strength such as permissible let-through current, I^2t of the equipments to be protected must be higher than that of a fuse.
- Note) Refer to the general considerations other than the above mentioned.*

2. Power fuses for motor loads

- The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
 - The fuse's current/time characteristic should cover the inrush current/time of the motor.
 - The inrush current of the motor must be within 5 times of the fuse rating and the fuse should withstand at least 10 seconds under the condition.
 - Fuse rated current \geq Motor full load current
- Note) Refer to the general considerations other than the above mentioned.*

3. Power fuses for combination with vacuum contactors

- The current at the intersection between a fuse characteristic curve and a contactor operation curve should be greater than the lowest interrupting current of a fuse.
 - And the current at the cross point between a fuse curve and a contactor minimum dropout curve should not be greater than the rated interrupting current of a contactor.
- Note) Refer to the general considerations other than the above mentioned.*

4. Power fuses for capacitor loads

- The fuse with sufficient rated current must be selected to avoid the deterioration of the fuse element due to permissible overload in the long term.
 - The fuse's current/time characteristic should cover the inrush current/time of the capacitor.
 - The size of inrush current depends on whether or not the serial reactors and parallel capacitors exist.
 - The inrush current of the capacitor must be within 70 times of the fuse rating and the fuse should withstand at least 0.002 second under the condition.
 - Fuse rated current \geq Capacitor rated current
 - In the case of serial reactor(6%) connected the inrush current must be within 5 times of the fuse rating and the fuse should withstand at least 0.1 second under the condition
- Note) Refer to the general considerations other than the above mentioned.*



Power fuses for transformer loads

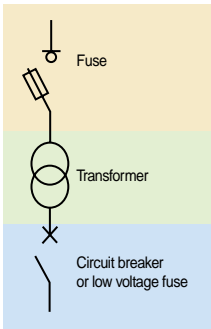


Power fuses for motor loads

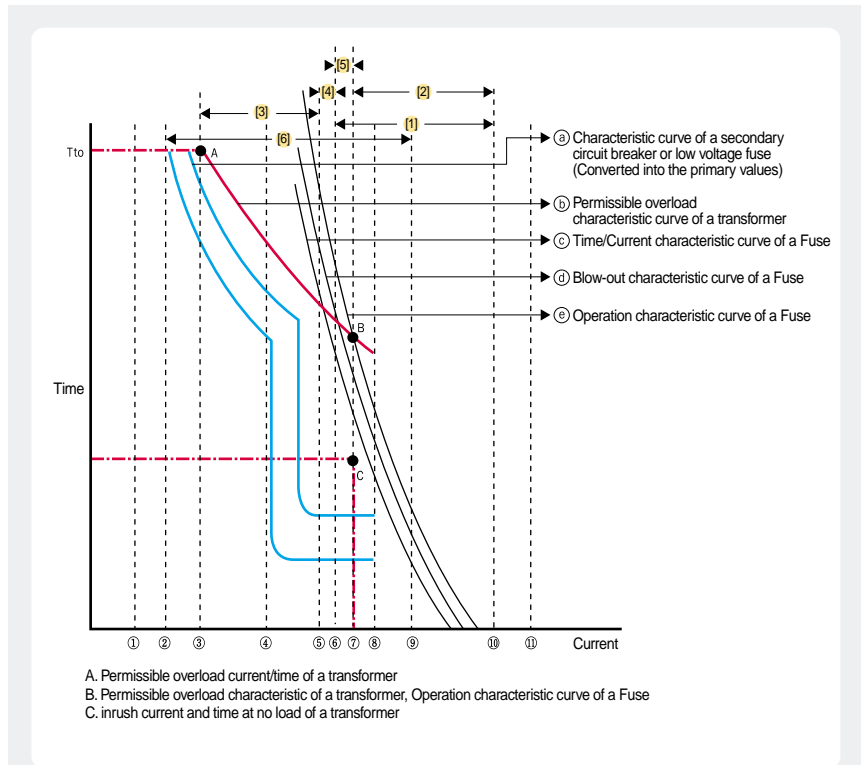
Note) Above picture shows korean standard type, If you want to order DIN type fuse, please contact LS Industrial Systems before you order it.

Coordination graph

Coordination between fuse and transformer circuit



- ① Full load current of a transformer
- ② The lowest interrupting current of the secondary circuit breaker
- ③ Permissible overload current of a transformer
- ④ Rated current of a fuse
- ⑤ Lowest blow-out current of a fuse
- ⑥ Lowest interrupting current of a fuse
- ⑦ Inrush current at no load of a transformer
- ⑧ Secondary short-circuit current
- ⑨ Rated interrupting current of a secondary circuit breaker
- ⑩ Primary short-circuit current
- ⑪ Rated interrupting current of a fuse



※ Coordination in the graph

- **Zone of [1]** : Protection of primary side from short-circuit by a fuse
- **Zone of [2]** : Protection of a transformer
- **Zone of [3]** : Out of the scope of fuse operation
- **Zone of [4]** : Interruption is not ensured even though the fuse blows.
- **Zone of [5]** : Protection of a transformer is not ensured even though the fuse interrupts the circuit.
- **Zone of [3]+[4]+[5]** : No protection zone of a transformer Circuit breaker or low voltage fuse required for the transformer protection

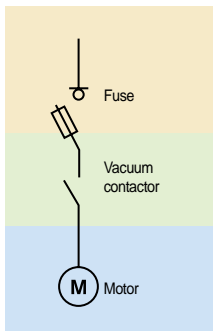
When any protection device is not installed in the secondary of a transformer

- Permissible overload current of a transformer (point ③)) must lie to the left of the curve ②(time/current characteristic curve of a Fuse)
- Full load current of a transformer ① ≤ Rated current of a fuse ④
- Point C (inrush current and time at no load of a transformer) must lie to the left of the point ②(time/current characteristic curve of a Fuse)
- Secondary short-circuit current ⑧ > Lowest interrupting current of a fuse ⑥
- Point B must lie to the left of the secondary short-circuit current ⑧.
- Primary short-circuit current ⑩ < Rated interrupting current of a fuse ⑪

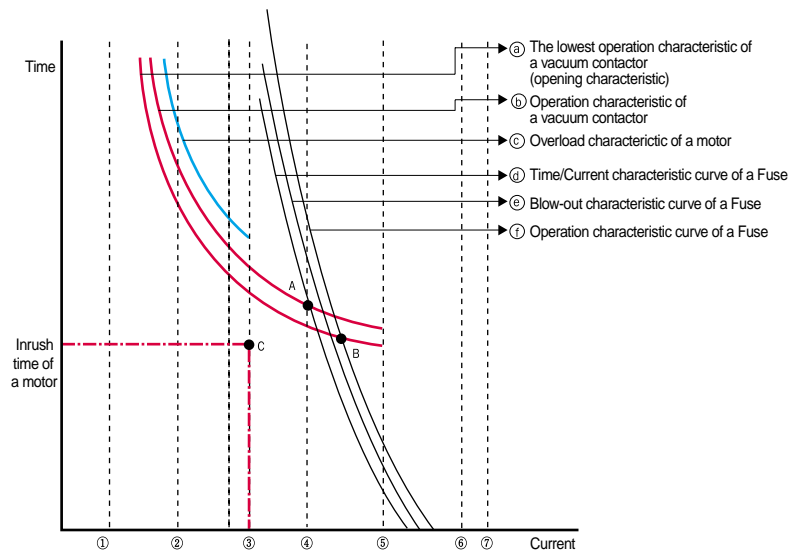
When a circuit breaker or fuse is installed in the secondary of a transformer

- Must meet the requirements above mentioned in ①
- The characteristic curve of a secondary circuit breaker or low voltage fuse ② must lie to the left of permissible overload characteristic curve of a transformer ③ and under the point B
- The characteristic curve of a secondary circuit breaker or low voltage fuse ② must lie to the Time/Current characteristic curve of a Fuse and under the Secondary short-circuit current ⑧.
- Secondary short-circuit current ⑧ < Characteristic curve of a secondary circuit breaker or low voltage fuse ②
- The secondary circuit breaker or low voltage fuse should meet the above mentioned requirements to each branch circuit.
- Another medium voltage protection device is required for the ensured protection against the fault happening between the secondary protection devices and the internal short-circuit of a transformer in the zone of [3]+[4]+[5].

Coordination between fuse and motor circuit



- ① Full load current of a motor
- ② Rated current of a fuse
- ③ Inrush current of a motor (Locked rotor current)
- ④ Lowest interrupting current of a fuse
- ⑤ Rated interrupting current of a vacuum contactor
- ⑥ Short-circuit current
- ⑦ Rated interrupting current of a fuse



- A : (Operation characteristic of a vacuum contactor, Time/Current characteristic curve of a Fuse)
- B : (The lowest operation characteristic of a vacuum contactor, Operation characteristic curve of a Fuse)
- C : (Inrush current of a motor, Inrush time of a motor)

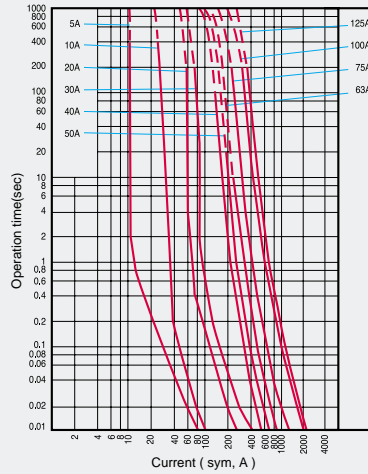
- Full load current of a motor ① \leq Rated current of a fuse ②
- Short-circuit current ⑥ $<$ Rated interrupting current of a fuse ⑦
- Inrush current of a motor (Locked rotor current) ③ $<$ Rated interrupting current of a vacuum contactor ⑤
- Point C must lie to the left of ③ (The lowest operation characteristic of a vacuum contactor) and ④ (Time/Current characteristic curve of a Fuse)
- Operation characteristic of a vacuum contactor ⑨ must lie to the left of ⑩ (Overload characteristic of a motor)
- Point A must lie to the right of ④ Lowest interrupting current of a fuse.
- Point B must lie to the left of ⑤ Rated interrupting current of a vacuum contactor.

Note) The current less than point A can be protected by a vacuum contactor, and the current greater than point B is to be protected by a fuse.

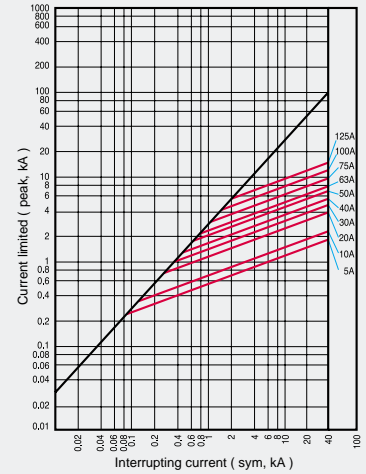
Operation curves

DIN Type

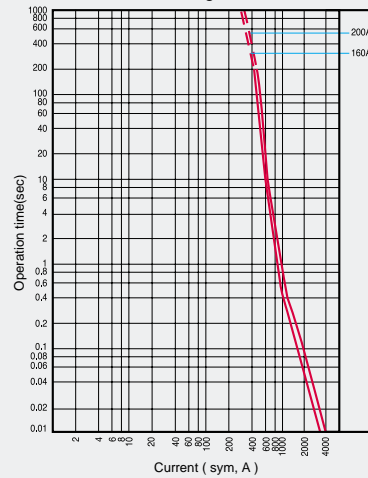
3.6/7.2kV blowing characteristic



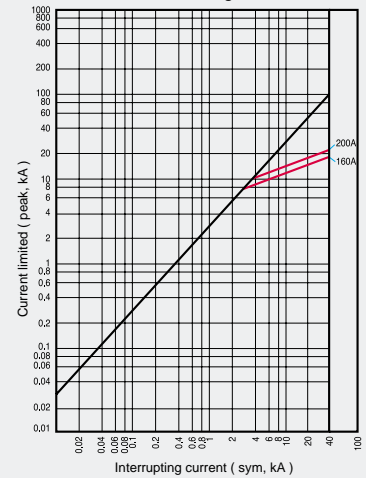
3.6/7.2kV current limiting characteristic



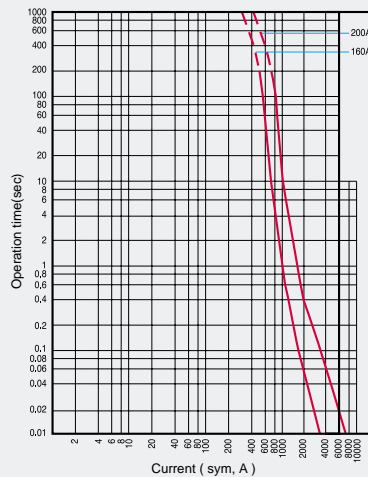
3.6kV blowing characteristic



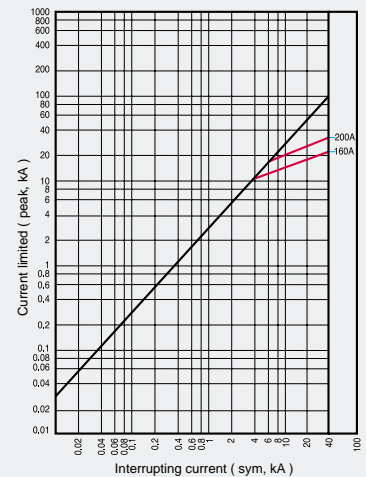
3.6kV current limiting characteristic



7.2kV blowing characteristic



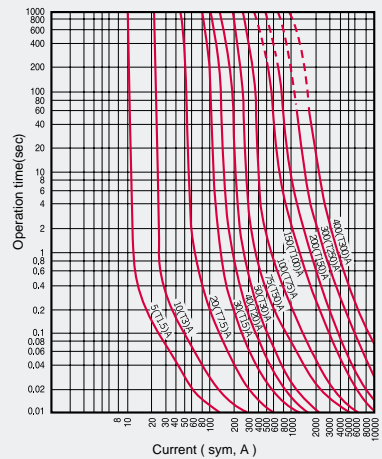
7.2kV current limiting characteristic



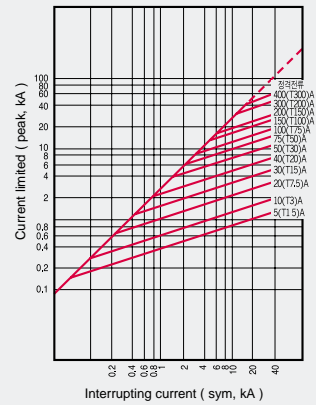
KS Type

G(General use) type fuse

3.6/7.2kV blowing characteristic

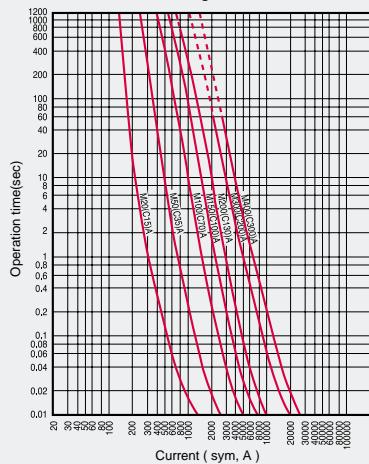


3.6/7.2kV current limiting characteristic

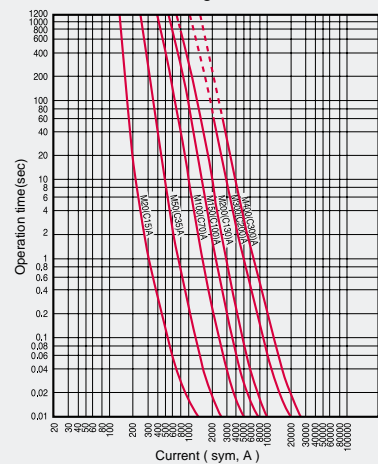


M(Motor protection) type fuse

3.6kV blowing characteristic



7.2kV blowing characteristic



3.6kV, 7.2kV current limiting characteristic

