

## Technical information

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Rating of contactors, Direct starters & Auxiliary contacts	122
Rated power of AC4	123
DC Application	124
Contactor selection for star-delta combination	125
Selection guide for lighting circuit switching	126
Short circuit coordination	127
Coil characteristics	130
Performance of contactors	132
Cabling and tightening torque	133
Terminal dimensions	134
Installation and environment	135
Ratings & Performance of contactors with delayed opening device	136
Structure and operation of the Mechanical interlock	137
Operational Characteristics of Latching Contactors	138
Setting method (Inverse time characteristics) EMPR	139
Setting method (Definite time characteristics) EMPR	141
Setting method DMPR	143
Wiring method DMPR	145
Electrical lifetime mini contactors	149
Electrical lifetime : GMC-9 to 85	150
Electrical lifetime : GMC-100 to 800	151
Trip curves for thermal overload relays	152
Trip curves for thermal overload relays, Class 20	154
Trip curves for electronic overload relays	155
Trip curves for digital motor protection relays	156



# Technical information

## Rating of contactors, Direct starters & Auxiliary contacts

### Ratings of Contactors and Direct starters

Type		Rating																AC1 (Ith) A
Contactors	Direct Starters	AC3						AC2						AC4				
		200~220V		380~440V		500~550V		200~220V		380~440V		500~550V		200~220V		380~440V		
		kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	
GMC - 9	GMS - 9	2.5	11	4	9	4	7	2.5	11	4	9	4	7	1.5	8	2.2	6	20
GMC - 12	GMS - 12	3.5	13	5.5	12	7.5	12	3.5	13	5.5	12	7.5	12	2.2	11	4	9	20
GMC - 18	GMS - 18	4.5	18	7.5	18	7.5	13	4.5	18	7.5	18	7.5	13	3.7	18	4	9	25
GMC - 22	GMS - 22	5.5	22	11	22	15	22	5.5	22	11	22	15	22	3.7	18	5.5	13	32
GMC - 32	GMS - 32	7.5	32	15	32	18.5	28	7.5	32	15	32	18.5	28	4.5	20	7.5	17	50
GMC - 40	GMS - 40	11	40	18.5	40	22	32	11	40	18.5	40	22	32	5.5	25	11	24	60
GMC - 50	GMS - 50	15	55	22	50	30	43	15	55	22	50	30	43	7.5	35	15	32	80
GMC - 65	GMS - 65	18.5	65	30	65	37	60	18.5	65	30	65	37	60	11	50	22	47	100
GMC - 75	GMS - 75	22	75	37	75	45	64	22	75	37	75	45	64	13	55	25	52	110
GMC - 85	GMS - 85	25	85	45	85	45	75	25	85	45	85	45	75	15	65	30	62	135
GMC - 100	GMS - 100	30	105	55	105	55	85	30	105	55	105	55	85	19	80	37	75	150
GMC - 125	GMS - 125	37	125	60	120	60	90	37	125	60	120	60	90	22	93	45	90	150
GMC - 150	GMS - 150	45	150	75	150	90	140	45	150	75	150	90	140	30	125	55	110	200
GMC - 180	GMS - 180	55	180	90	180	110	180	55	180	90	180	110	180	37	150	75	150	230
GMC - 220	GMS - 220	75	220	132	220	132	200	75	220	132	220	132	200	45	180	90	180	260
GMC - 300	GMS - 300	90	300	160	300	160	250	90	300	160	300	160	250	55	220	110	220	350
GMC - 400	GMS - 400	125	400	220	400	225	350	125	400	220	400	225	350	75	300	150	300	420
GMC - 600	GMS - 600	190	630	330	630	330	500	190	630	330	630	330	500	110	400	200	400	660
GMC - 800	GMS - 800	220	800	440	800	500	720	220	800	440	800	500	720	160	630	300	630	800

### Ratings of Auxiliary contacts

Type	Rated current (A)																AC1 (Ith) A
	AC 15				DC 13				AC 12				DC 12				
	110V	120V	440V	550V	24V	48V	110V	220V	110V	220V	440V	550V	24V	48V	110V	220V	
GMC(D)-9~22	6	3	1.5	1.2	3	1.5	0.55	0.27	10	8	5	5	5	3	2.5	1	16
GMC(D)-32~85	6	3	1.5	1.2	3	1.5	0.55	0.27	10	8	5	5	5	3	2.5	1	16
GMC-100~800	6	5	3	3	6	3	1.2	0.2	10	10	5	5	5	3	1.5	0.25	16

### Contact arrangement

Type	Standard	Option
GMC(D)-9~22	1NO 1NC	4NO, 3NO1NC, 2NO2NC, 1NO3NC
GMC(D)-32~85	2NO 2NC	4NO, 3NO1NC, 2NO2NC, 1NO3NC
GMC-100(/4)~800(/4)	2NO 2NC	2NO 2NC



# Rated power of AC4



## Rated power of AC4

Rated voltage(V) in main circuit	Rated power of inching operation (kW)												Rated power of plugging operation (kW)			
	200~220V						380~440V						200~220V		380~440V	
	10%		50%		100%		10%		50%		100%		Plugging 100%		Plugging 100%	
Electrical lifespan (x10,000 operation)	10	50	10	50	10	50	10	50	10	50	10	50	10	50	10	50
<b>GMC-9</b>	2.2	1	1	0.5	0.75	0.3	2.7	1.5	1.5	0.75	1.1	0.5	0.75	0.2	0.75	0.2
<b>GMC-12</b>	2.7	1.5	1.5	0.75	1.1	0.5	4	2.2	3.7	1.5	2.2	1.1	0.75	0.4	1	0.4
<b>GMC-18</b>	3.7	2.7	2.7	1.1	1.5	0.75	4	3.7	4	2.2	3.7	1.5	1.5	0.5	2.2	0.75
<b>GMC-22</b>	4	3.7	3.7	1.5	2.5	1.1	7.5	7.5	7.5	3.7	5.5	2.2	2.2	0.75	3.7	1.5
<b>GMC-32</b>	5.5	4.5	4.5	2.2	4.5	1.8	11	9	9	4.5	7.5	3.7	2.5	1.1	4.5	2.2
<b>GMC-40</b>	7.5	5.5	5.5	3.7	4.5	2.7	15	11	11	5.5	11	3.7	3.7	1.5	4.5	2.2
<b>GMC-50</b>	11	7.5	7.5	3.7	5.5	3.7	22	15	15	7.5	15	5.5	5.5	2.2	7.5	3.7
<b>GMC-65</b>	15	11	11	5.5	7.5	4	30	22	22	11	15	7.5	7.5	3	11	5.5
<b>GMC-75</b>	18.5	15	15	7.5	9	4	37	30	30	15	15	7.5	9	3.7	15	5.5
<b>GMC-85</b>	19	15	15	7.5	11	5.5	37	30	30	15	22	11	9	3.7	18.5	7.5
<b>GMC-100</b>	25	15	19	9	11	5.5	50	37	37	18.5	25	13	11	4.5	22	11
<b>GMC-125</b>	30	22	22	9	15	7.5	60	45	45	22	30	15	15	5.5	30	15
<b>GMC-150</b>	37	25	30	11	19	9	75	55	55	30	45	22	19	7.5	37	19
<b>GMC-180</b>	45	30	37	15	25	11	90	75	75	37	55	25	22	11	45	22
<b>GMC-220</b>	55	37	45	19	30	15	110	90	90	37	60	30	25	13	45	25
<b>GMC-300</b>	75	50	55	25	37	22	150	125	132	50	75	37	37	18.5	55	30
<b>GMC-400</b>	110	65	75	30	45	25	200	132	150	75	110	55	45	22	75	37
<b>GMC-600</b>	160	75	90	37	55	37	300	150	190	90	132	75	55	30	110	45
<b>GMC-800</b>	200	132	150	45	75	45	400	190	220	110	160	90	75	37	150	75

Note) 1. Inching(%)=  $\frac{\text{Times of inching operation}}{\text{Times of standard obligation} + \text{Times of inching operation}} \times 100$

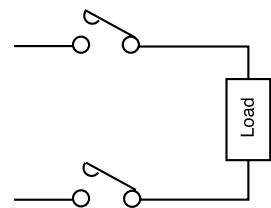
2. The limit of on/off operation frequency in inching is below 10 times based on 1 time/sec.

# Technical information

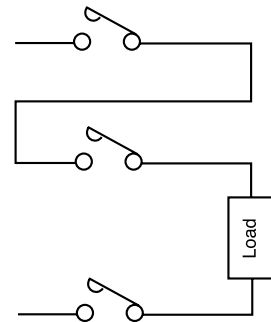
## DC Application

Type	Poles in series	Rated current (DC2, DC4) DC motor load (L/R=15ms)				Rated current (DC1) Resistant load (L/R=1ms)				Rated current (DC1) Coil load (L/R=100ms)			
		24V	48V	110V	220V	24V	48V	110V	220V	24V	48V	110V	220V
		<b>GMC(D)-9</b>	2	8	4	2.5	0.8	10	10	6	3	8	4
	3	8	6	4	2	10	10	8	8	8	6	3	0.8
<b>GMC(D)-12</b>	2	12	6	4	1.2	12	12	10	7	12	6	3	0.5
	3	12	10	8	4	12	12	12	12	12	10	5	2
<b>GMC(D)-18</b>	2	12	6	4	1.2	18	18	13	8	12	6	3	0.5
	3	12	10	8	4	18	18	18	18	12	10	5	2
<b>GMC(D)-22</b>	2	20	15	8	2	20	20	15	10	20	12	3	1.2
	3	20	20	15	8	20	20	20	20	20	15	10	4
<b>GMC(D)-32</b>	2	25	20	10	3	25	25	25	12	25	15	4	1.2
	3	25	25	20	10	25	25	25	22	25	25	12	4
<b>GMC(D)-40</b>	2	35	20	10	3	35	35	25	12	35	15	4	1.2
	3	35	30	20	10	35	35	35	30	35	25	12	4
<b>GMC(D)-50</b>	2	45	25	15	3.5	50	40	35	15				
	3	50	35	30	12	50	50	50	40				
<b>GMC(D)-65</b>	2	45	25	15	3.5	50	40	35	15				
	3	50	35	30	12	65	65	65	50				
<b>GMC(D)-75</b>	2	65	40	20	5	75	65	50	20				
	3	80	60	50	20	75	75	75	55				
<b>GMC(D)-85</b>	2	65	40	20	5	80	65	50	20				
	3	80	60	50	20	80	80	80	60				
<b>GMC-100</b>	2	100	60	40	30	100	100	80	50				
	3	100	90	80	50	100	100	100	80				
<b>GMC-125</b>	2	120	60	40	30	120	100	80	50				
	3	120	90	80	50	120	120	100	80				
<b>GMC-150</b>	2	150	100	80	60	150	120	100	100				
	3	150	130	120	80	150	150	150	150				
<b>GMC-180</b>	2	180	150	120	80	180	180	150	150				
	3	180	180	150	100	180	180	180	180				
<b>GMC-220</b>	2	220	150	120	80	220	180	150	150				
	3	220	220	150	100	220	220	220	220				
<b>GMC-300</b>	2	300	200	150	90	300	240	200	200				
	3	300	280	200	150	300	300	300	300				
<b>GMC-400</b>	2	400	200	150	90	400	240	200	200				
	3	400	280	200	150	400	400	400	300				
<b>GMC-600</b>	2	630	630	630	630	630	630	630	630				
	3	630	630	630	630	630	630	630	630				
<b>GMC-800</b>	2	800	630	630	630	800	800	630	630				
	3	800	630	630	630	800	800	800	800				

2 poles in series



3 poles in series



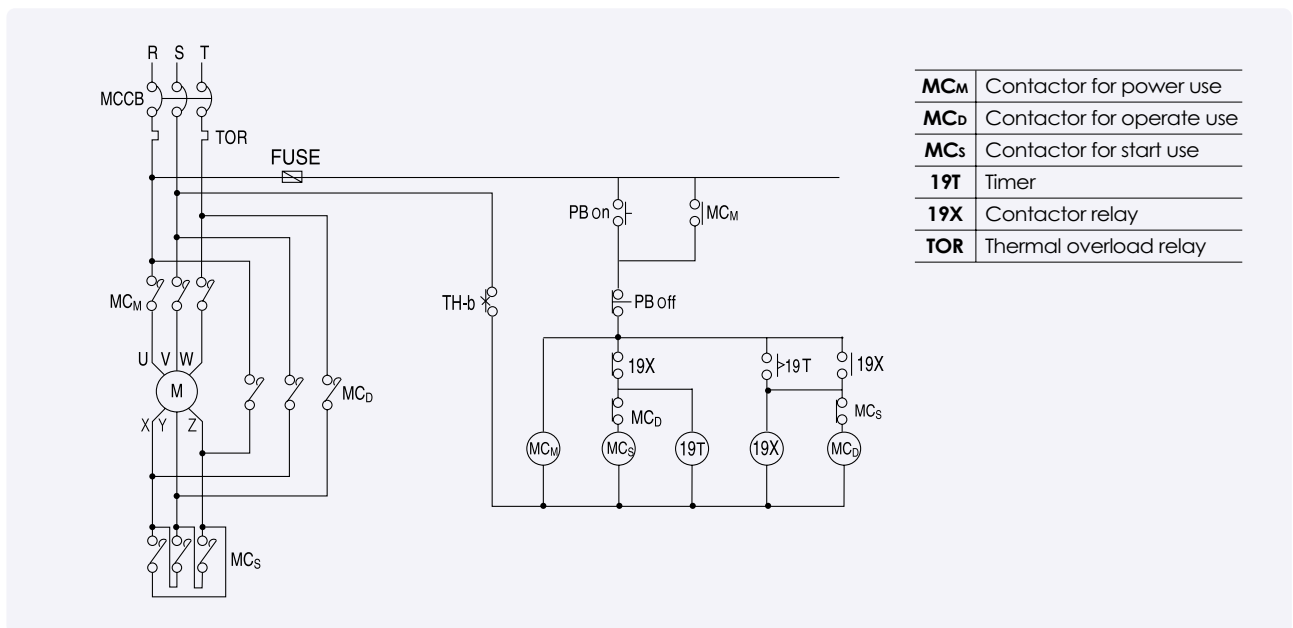
## Ratings for star-delta use Contactor

Start method	Start (Star contactors)				Operate (Delta contactor)		
	Start current	Torque	Full load current	Contact voltage	Full load current	Contact current	Contact voltage
Direct	6Im	1.5T	6Im	$E_m/\sqrt{3}$	Im	Im	$E_m/\sqrt{3}$
Star - delta	2Im	0.5T	2Im	$E_m/\sqrt{3}$	Im	$Im/\sqrt{3}$	$E_m$

## Contactor selection for star-delta use

Motor ratings		200~220V			380~480V		
(kW)	(HP)	Start use(MC <sub>s</sub> )	Operate use(MC <sub>D</sub> )	Power(MC <sub>M</sub> )	Start use(MC <sub>s</sub> )	Operate use(MC <sub>D</sub> )	Power(MC <sub>M</sub> )
5.5	7.5	GMC-9	GMC-18	GMC-18	GMC-9	GMC-12	GMC-12
7.5	10	GMC-12	GMC-18	GMC-18	GMC-9	GMC-18	GMC-18
11	10	GMC-18	GMC-32	GMC-32	GMC-12	GMC-18	GMC-18
15	20	GMC-22	GMC-50	GMC-50	GMC-18	GMC-18	GMC-18
18.5	25	GMC-32	GMC-50	GMC-50	GMC-18	GMC-22	GMC-22
22	30	GMC-32	GMC-65	GMC-65	GMC-18	GMC-32	GMC-32
30	40	GMC-65	GMC-85	GMC-85	GMC-22	GMC-50	GMC-50
37	50	GMC-65	GMC-100	GMC-100	GMC-32	GMC-50	GMC-50
45	50	GMC-75	GMC-125	GMC-125	GMC-32	GMC-65	GMC-65
55	60	GMC-85	GMC-150	GMC-150	GMC-50	GMC-85	GMC-85
75	100	GMC-100	GMC-180	GMC-180	GMC-65	GMC-100	GMC-100
90	125	GMC-125	GMC-220	GMC-220	GMC-65	GMC-125	GMC-125
110	125	GMC-150	GMC-300	GMC-300	GMC-85	GMC-150	GMC-150
132	150	GMC-180	GMC-300	GMC-300	GMC-100	GMC-180	GMC-180
160	200	GMC-220	GMC-400	GMC-400	GMC-125	GMC-220	GMC-220
250	300	GMC-300	GMC-600	GMC-600	GMC-150	GMC-300	GMC-300
300	400	GMC-400	GMC-600	GMC-600	GMC-220	GMC-400	GMC-400

- Note] 1. Above selection is made under AC3 standard squirrel cage motor use basis.  
 The selection may be changed according to the motor class or manufacturer  
 2. The motor start time is within 15sec  
 3. When you use phase advanced condenser, consider the inrush current for selection.



(Fig 1) Example of a wiring diagram for star-delta combination

# Technical information

## Selection guide for lighting circuit switching

### Incandescent

Maximum quantity of lamps per contactor

Type	Consumption	100V								200V							
		100W	150W	200W	250W	300W	500W	1000W	1500W	100W	150W	200W	250W	300W	500W	1000W	1500W
GMC(D)-9		11	7	5	4	3	2	1	-	22	14	11	8	7	4	2	1
GMC(D)-12		13	8	6	5	4	2	1	-	26	17	13	10	8	5	2	1
GMC(D)-18		18	12	9	7	6	3	1	1	36	24	18	14	12	7	3	2
GMC(D)-22		19	12	9	7	6	3	1	1	38	25	19	15	12	7	3	2
GMC(D)-32		26	17	13	10	8	5	2	1	52	34	26	20	17	10	5	3
GMC(D)-40		35	23	17	14	11	7	3	2	70	46	35	28	23	14	7	4
GMC(D)-50		50	33	25	20	15	10	5	3	100	66	50	40	33	20	10	6
GMC(D)-65		65	42	32	26	19	13	6	4	130	85	65	52	42	26	13	8

### Fluorescent

Maximum quantity of rapid-start fluorescents per contactor

Type	Consumption	100V							200V							
		40W		60W	80W	110W		220W	40W		60W	80W	110W		220W	
	N° Fluorescent.	1	2	1	1	1	2	1	1	2	1	1	1	2	1	1
	(A)	0.95 (1.2)	0.96 (1.1)	0.92	1.17	1.55	2.5	2.7	0.29 (0.6)	0.48 (0.55)	0.46	0.58	0.78	1.3	1.36	2.5
GMC(D)-9		18 (9)	11 (10)	12	9	7	4	4	37 (18)	22 (20)	23	19	14	8	8	4
GMC(D)-12		22 (10)	13 (11)	14	11	8	5	4	44 (21)	27 (23)	28	22	16	10	9	5
GMC(D)-18		30 (15)	18 (16)	19	15	11	7	6	62 (30)	37 (32)	39	31	23	13	13	7
GMC(D)-22		32 (15)	19 (17)	20	16	12	7	7	65 (31)	39 (34)	41	32	24	14	14	7
GMC(D)-32		44 (21)	27 (23)	28	22	16	10	9	89 (43)	54 (47)	56	44	33	20	19	10
GMC(D)-40		59 (29)	36 (31)	38	29	22	14	13	120 (58)	72 (63)	76	60	44	26	25	14
GMC(D)-50		84 (41)	52 (45)	54	42	32	20	18	172 (83)	104 (90)	108	86	64	38	37	20
GMC(D)-65		110 (54)	67 (59)	70	55	41	26	24	224 (108)	135 (118)	141	112	83	50	48	26

Note) 1. In 1 lamps, ( ) is the number of the lamps with low power factor.  
2. In 2 lamps, ( ) is the number of the flickerless type lamps.

### Mercury lamp

Maximum quantity of mercury lamps per contactor

Type	Consumption	Low power factor type-High power factor type															
		40W	100W	200W	250W	300W	400W	700W	1000W	40W	100W	200W	250W	300W	400W	700W	1000W
	(A)	1.25	2.6	4.6	5.1	6.0	8.0	14.5	21	0.53	1.0	1.9	2.1	2.5	3.3	5.9	8.5
	0.55	1.4	2.6	3.0	3.7	4.9	8.5	12	-	0.65	1.2	1.5	1.8	2.3	4.1	5.8	
GMC(D)-9		8/20	4/7	2/4	2/3	1/2	1/1	-/-	-/-	20/-	11/16	5/9	5/7	4/6	3/4	1/2	1/1
GMC(D)-12		10/23	5/9	2/5	2/4	2/3	1/1	-/1	-/1	24/-	13/20	6/10	6/8	5/7	3/5	2/3	1/2
GMC(D)-18		14/32	6/12	3/6	3/6	3/4	2/3	1/2	-/1	33/-	18/27	9/15	8/12	7/10	5/7	3/3	2/3
GMC(D)-22		15/34	7/13	4/7	3/6	3/5	2/3	1/2	-/1	35/-	19/29	10/15	9/12	7/10	5/8	3/4	2/3
GMC(D)-32		20/47	10/18	5/10	5/8	4/7	3/5	1/3	1/2	49/-	26/40	13/21	12/17	10/14	7/11	4/6	3/4
GMC(D)-40		28/63	13/25	7/13	6/11	5/9	4/7	2/4	1/2	66/-	35/53	18/29	16/23	14/19	10/15	5/8	4/6
GMC(D)-50		40/90	19/35	10/19	9/16	8/13	6/10	3/5	2/4	94/-	50/76	26/41	23/33	20/27	15/21	8/12	6/8
GMC(D)-65		52/118	25/46	14/25	12/21	10/17	8/13	4/7	3/5	122/-	65/100	34/54	30/43	26/36	19/28	11/15	7/11

## Direct starters with molded case circuit breakers (50kA-415V · IEC60947)

Motor		MCCB		Contactor	Thermal overload relay	
(kW)	440V(A)	Type	Rating Ir(A)	Type	Type	Settings range (A)
5.5	11	GBH(L)103	16	GMC-32	<b>GTH(K)-40</b>	9~13
7.5	15	GBH(L)103	16	GMC-32	<b>GTH(K)-40</b>	12~18
10	19	GBH(L)103	25	GMC-32	<b>GTH(K)-40</b>	18~26
11	21	GBH(L)103	25	GMC-32	<b>GTH(K)-40</b>	18~26
15	28	GBH(L)103	32	GMC-32	<b>GTH(K)-40</b>	24~36
18.5	34	GBH(L)103	40	GMC-75	<b>GTH(K)-85</b>	28~40
22	39	GBH(L)103	50	GMC-75	<b>GTH(K)-85</b>	34~50
30	54	GBH(L)103	63	GMC-75	<b>GTH(K)-85</b>	45~65
37	66	GBH(L)103	80	GMC-75	<b>GTH(K)-85</b>	54~75
45	80	GBH(L)103	100	GMC-100	<b>GTH(K)-100</b>	65~100
55	99	GBH(L)103	100	GMC-100	<b>GTH(K)-100</b>	85~125
75	135	GBH(L)203	160	GMC-150	<b>GTH(K)-150</b>	100~150
90	160	GBH(L)203	200	GMC-180	<b>GTH(K)-220</b>	120~180
110	192	GBH(L)203	200	GMC-180	<b>GTH(K)-220</b>	160~240
132	226	GBH(L)203	250	GMC-220	<b>GTH(K)-220</b>	160~240
160	265	ABH(L)403b	300	GMC-400	<b>GTH(K)-400</b>	200~300
200	330	ABH(L)403b	350	GMC-400	<b>GTH(K)-400</b>	260~400
220	353	ABH(L)403b	400	GMC-400	<b>GTH(K)-400</b>	260~400
250	400	ABS(L)803b	500	GMC-600	<b>GTH(K)-600</b>	260~400
300	480	ABS(L)803b	500	GMC-600	<b>GTH(K)-600</b>	400~600

Note) \* Magnetic only

## Direct starters with molded case circuit breakers (85kA-415V · IEC60947)

Motor		MCCB		Contactor	Thermal overload relay	
(kW)	440V(A)	Type	Rating Ir(A)	Type	Type	Settings range (A)
5.5	11	GBL103	16	GMC-32	<b>GTH(K)-40</b>	9~13
7.5	15	GBL103	16	GMC-32	<b>GTH(K)-40</b>	12~18
10	19	GBL103	25	GMC-32	<b>GTH(K)-40</b>	18~26
11	21	GBL103	25	GMC-32	<b>GTH(K)-40</b>	18~26
15	28	GBL103	32	GMC-32	<b>GTH(K)-40</b>	24~36
18.5	34	GBL103	40	GMC-75	<b>GTH(K)-85</b>	28~40
22	39	GBL103	50	GMC-75	<b>GTH(K)-85</b>	34~50
30	54	GBL103	63	GMC-75	<b>GTH(K)-85</b>	45~65
37	66	GBL103	80	GMC-75	<b>GTH(K)-85</b>	54~75
45	80	GBL103	100	GMC-100	<b>GTH(K)-100</b>	65~100
55	99	GBL103	100	GMC-100	<b>GTH(K)-100</b>	85~125
75	135	GBL203	160	GMC-150	<b>GTH(K)-150</b>	100~150
90	160	GBL203	200	GMC-180	<b>GTH(K)-220</b>	120~180
110	192	GBL203	200	GMC-180	<b>GTH(K)-220</b>	160~240
132	226	GBL203	250	GMC-220	<b>GTH(K)-220</b>	160~240
160	265	ABL403b	300	GMC-400	<b>GTH(K)-400</b>	200~300
200	330	ABL403b	350	GMC-400	<b>GTH(K)-400</b>	260~400
220	353	ABL403b	400	GMC-400	<b>GTH(K)-400</b>	260~400
250	400	ABL803b	500	GMC-600	<b>GTH(K)-600</b>	260~400
300	480	ABL803b	500	GMC-600	<b>GTH(K)-600</b>	400~600

Note) Tables are based on a combination of tests on a previous range and technical comparison.

# Technical information

## Short circuit coordination

### Contactors with protection fuses

Type	AC1(A)	690V AC3 Ie(A)	Short-circuit test	
			Fuse available fault current 100,000A	Ue / $I^2$
<b>GMC-9</b>	20	5	gL/gG 25A	690V/1kA
<b>GMC-12</b>	20	9	gL/gG 32A	690V/1kA
<b>GMC-18</b>	25	9	gL/gG 35A	690V/3kA
<b>GMC-22</b>	32	18	gL/gG 50A	690V/3kA
<b>GMC-32</b>	50	20	gL/gG 63A	690V/3kA
<b>GMC-40</b>	60	23	gL/gG 80A	690V/3kA
<b>GMC-50</b>	80	28	gL/gG 100A	690V/3kA
<b>GMC-65</b>	100	35	gL/gG 100A	690V/3kA
<b>GMC-75</b>	110	42	gL/gG 100A	690V/3kA
<b>GMC-85</b>	135	45	gL/gG 200A	690V/3kA
<b>GMC-100</b>	150	65	gL/gG 150A	690V/5kA
<b>GMC-125</b>	150	70	gL/gG 160A	690V/5kA
<b>GMC-150</b>	200	100	gL/gG 200A	690V/5kA
<b>GMC-180</b>	230	120	gL/gG 225A	690V/5kA
<b>GMC-220</b>	260	150	gL/gG 250A	690V/10kA
<b>GMC-300</b>	350	220	gL/gG 355A	690V/10kA
<b>GMC-400</b>	420	300	gL/gG 400A	690V/10kA
<b>GMC-600</b>	660	420	gL/gG 630A	690V/18kA
<b>GMC-800</b>	800	630	gL/gG 800A	690V/18kA

Note) Tables are based on a combination of tests on a previous range and technical comparison.



## Thermal overload relays with protection fuses

Type	AC1(A)	690V AC3 I <sub>e</sub> (A)	Short-circuit test	
			Fuse available fault current 100,000A	U <sub>e</sub> / "r"
GTH(K)-22	32	1.6	gL/gG 4A	690V/1kA
GTH(K)-22		2.5	gL/gG 6A	690V/1kA
GTH(K)-22		4	gL/gG 10A	690V/1kA
GTH(K)-22		22	gL/gG 50A	690V/3kA
GTH(K)-40	60	6	gL/gG 16A	690V/1kA
GTH(K)-40		8	gL/gG 20A	690V/1kA
GTH(K)-40		9	gL/gG 20A	690V/1kA
GTH(K)-40		40	gL/gG 80A	690V/3kA
GTH(K)-85	135	18	gL/gG 35A	690V/3kA
GTH(K)-85		22	gL/gG 50A	690V/3kA
GTH(K)-85		26	gL/gG 63A	690V/3kA
GTH(K)-85		36	gL/gG 80A	690V/3kA
GTH(K)-85		40	gL/gG 80A	690V/3kA
GTH(K)-85		50	gL/gG 100A	690V/3kA
GTH(K)-85		65	gL/gG 160A	690V/5kA
GTH(K)-85		75	gL/gG 160A	690V/5kA
GTH(K)-85	150	85	gL/gG 200A	690V/5kA
GTH(K)-100		65	gL/gG 150A	690V/5kA
GTH(K)-100	200	125	gL/gG 225A	690V/5kA
GTH(K)-150		100	gL/gG 200A	690V/5kA
GTH(K)-150	260	150	gL/gG 250A	690V/10kA
GTH(K)-220		150	gL/gG 250A	690V/10kA
GTH(K)-220	420	240	gL/gG 355A	690V/10kA
GTH(K)-400		300	gL/gG 400A	690V/10kA
GTH(K)-400	800	400	gL/gG 630A	690V/18kA
GTH(K)-600		400	gL/gG 630A	690V/18kA
GTH(K)-600		630	gL/gG 800A	690V/18kA
GTH(K)-600		800	gL/gG 1400A	690V/30kA

Note) Tables are based on a combination of tests on a previous range and technical comparison.

# Technical information

## Coil characteristics

### Operating limits

When the operating coil is in the energized state an operating tolerance of between 85~110% of the coil's rated voltage is permitted, at temperatures up to 40°C at standard operating frequency. Operation out with the above may cause deterioration to electrical insulation and mechanical operation.

### Selections of coil

In GMC-9~85 contactors, 50Hz coil and 60Hz coil are separated.

But in GMC-100~800 contactors, the coils are AC/DC common use. (under DC 220V)

### Characteristics of AC coil

#### AC 220V, 60Hz

Type	Coil consumption (VA)		Thermal dissipation (W)	Operational voltage(V)		Coil current (mA)	Operational time (ms)	
	Inrush	Holding		Pick-up	Drop-out		Closing	Opening
GMC-9(/4)~22(/4)	95	9	2	141~156(142~157)*	105~125(112~132)*	41(36)	10~17	6~9
GMC-32(/4), 40(/4)	95	9	2	150~165(151~166)*	110~130(117~137)*	41(36)	11~19	6~10
GMC-50(/4)~85(/4)	220	17	5	145~160(146~161)*	100~120(107~127)*	77(68)	16~25	8~15
GMC-100, 125	298	12.3	4.4	77	48	56	30~34	63~67
GMC-150	298	12.3	4.4	77	48	56	37~41	47~52
GMC-180, 200	380	11.6	4.7	77	48	53	45	45
GMC-100(/4)~220(/4)	380	11.6	4.7	77	48	53	45	45
GMC-300(/4), 400(/4)	571	14	5	77	48	64	45~50	48~52
GMC-600(/4), 800(/4)	1000	29	7.8	150	91	132	66~69	55

Note) 1. Average values. 2. ( )\* values for 50Hz.

#### AC 110V, 60Hz

Type	Coil consumption (VA)		Thermal dissipation (W)	Operational voltage(V)		Coil current (mA)	Operational time (ms)	
	Inrush	Holding		Pick-up	Drop-out		Closing	Opening
GMC-9(/4)~22(/4)	95	9	2	75~85(74~84)*	55~65(54~64)*	73(73)*	11~18	6~9
GMC-32(/4), 40(/4)	95	9	2	75~85(74~84)*	55~65(54~64)*	73(73)*	13~20	6~9
GMC-50(/4)~85(/4)	220	17	5.5	68~78(67~77)*	40~50(39~49)*	154(154)*	16~25	9~16
GMC-100, 125	162	9.8	3.1	77	48	89	46~50	49~53
GMC-150	162	12.2	3	77	48	111	56~60	44~48
GMC-180, 200	220	9.1	3.4	77	48	83	60	41
GMC-100(/4)~220(/4)	220	9.1	3.4	77	48	83	60	41
GMC-300(/4), 400(/4)	393	14	4.4	77	48	128	64~68	43~47
GMC-600(/4), 800(/4)	1000	17	6.3	77	48	155	66~70	45~49

Note) 1. Average values. 2. ( )\* values for 50Hz.

### Characteristics of DC coil

#### DC 110V

Type	Coil consumption (VA)		Thermal contact (W)	Operational voltage(V)		Coil current (mA)	Operational time (ms)	
	Inrush	Holding		Pick-up	Drop-out		Closing	Opening
GMD-9(/4)~22(/4)	9	9	50	60~75	15~35	82	45~55	8~15
GMD-32(/4), 40(/4)	9	9	50	60~75	15~35	82	45~55	8~15
GMD-50(/4)~85(/4)	220	5	-	65~80	15~35	46	20~30	13~20

## Coil characteristics for GMR series

### AC coil (AC 220V, 60Hz)

Type		Coil consumption (VA)		Thermal dissipation (W)	Operation voltage (V)		Operation time (ms)			
		Inrush	Holding		Pick-up	Drop-out	Coil ON → NO contact ON	Coil ON → NC contact OFF	Coil OFF → NO contact OFF	Coil OFF → NC contact ON
GMR - 4	4NO	95	9	2	141~156	105~125	10~17	-	7~13	-
	2NO2NC				138~148	110~130	8~15	6~15	7~13	8~15
GMR - 6	6NO				145~160	100~120	10~17	-	7~13	-
	3NO3NC				140~155	105~125	10~16	5~13	7~13	8~15
GMR - 6	8NO				150~160	90~110	10~18	-	7~13	-
	4NO4NC				148~158	95~115	10~16	5~13	7~13	8~15

### DC coil (DC 110V)

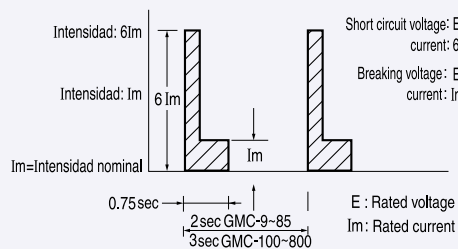
Type		Coil consumption (VA)		Thermal dissipation (W)	Operation voltage (V)		Operation time (ms)			
		Inrush	Holding		Pick-up	Drop-out	Coil ON → NO contact ON	Coil ON → NC contact OFF	Coil OFF → NO contact OFF	Coil OFF → NC contact ON
GMR - 4D	4NO	9	9	50	65~75	15~35	45~55	-	7~13	-
	2NO2NC				63~73	18~38	40~50	20~30	7~13	13~19
GMR - 6D	6NO				68~78	15~35	45~55	-	7~13	-
	3NO3NC				63~73	18~38	40~50	20~30	7~13	8~15
GMR - 6D	8NO				70~80	15~35	45~55	-	7~13	-
	4NO4NC				63~73	18~38	40~50	20~30	7~13	13~19

# Technical information

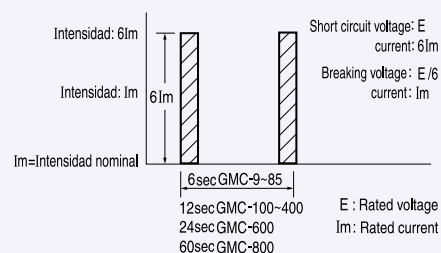
## Performance of contactors

Type	Rated voltage (V)	Rated current (A)	Short circuit max. current	Breaking capacity	Cycles per hour at AC3	Endurance (× 10,000 operations)		Performance Indicate
						Mechanical	Electrical	
GMC-9	220	11	132	110	1800	2500	250	AC3 · 1 · 0-0
	440	9	108	90				
GMC-12	220	13	156	130	1800	2500	250	AC3 · 1 · 0-0
	440	12	144	120				
GMC-18	220	18	216	180	1800	2500	250	AC3 · 1 · 0-0
	440	18	216	180				
GMC-22	220	22	264	220	1800	2500	250	AC3 · 1 · 0-0
	440	22	264	220				
GMC-32	220	32	385	320	1800	1500	200	AC3 · 1 · 0-0
	440	32	385	320				
GMC-40	220	40	480	400	1800	1500	200	AC3 · 1 · 0-0
	440	40	480	400				
GMC-50	220	55	660	550	1200	1000	200	AC3 · 1 · 0-0
	440	50	600	500				
GMC-65	220	65	780	650	1200	1000	200	AC3 · 1 · 0-0
	440	65	780	650				
GMC-75	220	75	900	750	1200	1000	200	AC3 · 1 · 0-0
	440	75	900	750				
GMC-85	220	80	960	800	1200	1000	200	AC3 · 1 · 0-0
	440	80	960	800				
GMC-100	220	105	1050	1050	1200	500	100	AC3 · 1 · 1-0
	440	105	1050	1050				
GMC-125	220	125	1250	1250	1200	500	100	AC3 · 1 · 1-0
	440	120	1200	1200				
GMC-150	440	150	1500	1500	1200	500	100	AC3 · 1 · 1-0
	440	150	1500	1500				
GMC-180	220	180	1800	1800	1200	500	100	AC3 · 1 · 1-0
	440	180	1800	1800				
GMC-220	220	220	2200	2200	1200	500	100	ACC3 · 1 · 1-0
	440	220	2200	2200				
GMC-300	220	300	3000	3000	1200	500	100	AC3 · 1 · 1-0
	440	300	3000	3000				
GMC-400	220	400	4000	4000	1200	500	50	AC3 · 1 · 1-1
	440	400	4000	4000				
GMC-600	220	630	6300	6300	1200	500	50	ACC3 · 1 · 1-1
	440	630	6300	6300				
GMC-800	220	800	8000	8000	1200	500	50	AC3 · 1 · 1-1
	440	800	8000	8000				

### Test duty of the electrical endurance (AC3)



### Test duty of the electrical endurance (AC4)



## 3-pole Contactors

Type	Cable section		Screw size		Torque(Nm)		
	AWG /MCM	ISOmm <sup>2</sup>		Contactor terminal	Coil terminal	Principal main	Aux.
		MIN	MAX				
GMC-9	10 AWG	1,5	4	M4	M3.5	2,3	2,3
GMC-12	10 AWG	1,5	4	M4	M3.5	2,3	2,3
GMC-18	10 AWG	1,5	6	M4	M3.5	4	2,3
GMC-22	8 AWG	2,5	10	M4	M3.5	4	2,3
GMC-32	6 AWG	4	16	M5	M3.5	4	2,3
GMC-40	6 AWG	4	16	M5	M3.5	4	2,3
GMC-50	4 AWG	6	25	M6	M3.5	5	2,3
GMC-65	2 AWG	10	35	M8	M3.5	5	2,3
GMC-75	2 AWG	10	35	M8	M3.5	5	2,3
GMC-85	0 AWG	10	50	M8	M3.5	5	2,3
GMC-100	00 AWG	25	70	M8	M4	9	2,3
GMC-125	00 AWG	25	70	M8	M4	9	2,3
GMC-150	0000 AWG	35	95	M8	M4	9	2,3
GMC-180	250 MCM	50	120	M10	M4	15	2,3
GMC-220	300 MCM	70	150	M10	M4	15	2,3
GMC-300	500 MCM	95	240	M12	M4	23	2,3
GMC-400	N° 2 30×5	150		M12	M4	23	2,3
GMC-600	N° 2 50×5	240		M16	M4	57	2,3
GMC-800	N° 2 60×5	240		M16	M4	57	2,3

## 4-pole Contactors

Type	Cable section		Screw size		Torque(Nm)	
	AWG/MCM	ISOmm <sup>2</sup>	Contactor terminal	Coil terminal	Principal main	Aux.
GMC-9/4	10 AWG	4	M3.5	M3.5	2,3	2,3
GMC-12/4	10 AWG	4	M3.5	M3.5	2,3	2,3
GMC-18/4	8 AWG	6	M4	M3.5	4	2,3
GMC-22/4	8 AWG	10	M4	M3.5	4	2,3
GMC-32/4	6 AWG	16	M5	M3.5	4	2,3
GMC-40/4	6 AWG	16	M5	M3.5	4	2,3
GMC-50/4	4 AWG	25	M6	M3.5	5	2,3
GMC-65/4	2 AWG	35	M8	M3.5	5	2,3
GMC-75/4	2 AWG	35	M8	M3.5	5	2,3
GMC-85/4	0 AWG	50	M8	M3.5	5	2,3
GMC-100/4	00 AWG	70	M8	M4	9	2,3
GMC-125/4	00 AWG	70	M8	M4	9	2,3
GMC-150/4	0000 AWG	95	M8	M4	9	2,3
GMC-180/4	250 MCM	120	M10	M4	15	2,3
GMC-220/4	300 MCM	150	M10	M4	15	2,3
GMC-300/4	500 MCM	240	M12	M4	23	2,3
GMC-400/4	N° 2 30×5	150	M12	M4	23	2,3
GMC-600/4	N° 2 50×5	240	M16	M4	57	2,3
GMC-800/4	N° 2 60×5	240	M16	M4	57	2,3

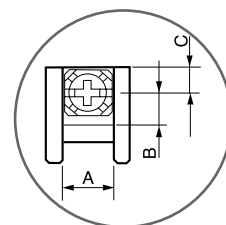
## Thermal overload relays

Type	Setting range	Cable selection		Torque (Nm)	Terminal screw size	
		AWG /MCM	ISOmm <sup>2</sup>			
GTH(K)-22	0.1~0.16	18AWG	1,5	2,3	M4	
	0.16~0.25	18AWG	1,5	2,3	M4	
	0.25~0.4	18AWG	1,5	2,3	M4	
	0.4~0.63	18AWG	1,5	2,3	M4	
	0.63~1	18AWG	1,5	2,3	M4	
	1~1.6	18AWG	1,5	2,3	M4	
	1.6~2.5	18AWG	1,5	2,3	M4	
	2.5~4	18AWG	1,5	2,3	M4	
	4~6	18AWG	1,5	2,3	M4	
	5~8	16AWG	1,5	2,3	M4	
	6~9	16AWG	1,5	2,3	M4	
	7~10	16AWG	1,5	2,3	M4	
	9~13	14AWG	1,5-2,5	2,3	M4	
	12~18	12AWG	2,5	2,3	M4	
	16~22	10AWG	2,5-4,0	2,3	M4	
	GTH(K)-40	4~6	18AWG	1,5	4	M5
5~8		16AWG	1,5	4	M5	
6~9		16AWG	1,5	4	M5	
7~10		16AWG	1,5	4	M5	
9~13		14AWG	1,5-2,5	4	M5	
12~18		12AWG	2,5	4	M5	
16~22		10AWG	2,5-4,0	4	M5	
18~26		10AWG	2,5-6,0	4	M5	
24~36		10AWG	4,0-10	4	M5	
28~40		10AWG	6,0-10	4	M5	
7~10		16AWG	1,5	5,1	M6	
9~13		14AWG	1,5-2,5	5,1	M6	
12~18		12AWG	2,5	5,1	M6	
16~22		10AWG	2,5-4,0	5,1	M6	
18~26		10AWG	2,5-6,6	5,1	M6	
24~36		10AWG	4,0-10	5,1	M6	
GTH(K)-85	28~40	10AWG	6,0-10	5,1	M6	
	34~50	6AWG	10-16	5,1	M6	
	45~65	4AWG	10-25	5,1	M8	
	54~75	4AWG	16-25	5,1	M8	
	63~85	3AWG	16-35	5,1	M8	
	34~50	6AWG	10-16	9	M8	
	39~57	6AWG	10-16	9	M8	
	GTH(K)-100	43~65	4AWG	10-25	9	M8
		54~80	4AWG	16-25	9	M8
		65~100	2AWG	25-35	9	M8
		85~125	1AWG	35-50	9	M8
		34~50	6AWG	10-16	9	M8
		39~57	6AWG	10-16	9	M8
		43~65	4AWG	10-25	9	M8
		54~80	4AWG	16-25	9	M8
	GTH(K)-150	65~100	2AWG	25-35	9	M8
85~125		1AWG	35-50	9	M8	
100~150		00AWG	35-70	9	M8	
65~100		2AWG	25-35	15	M10	
85~125		1AWG	35-50	15	M10	
100~160		00AWG	35-70	15	M10	
120~180		000AWG	50-95	15	M10	
160~240		250AWG	70-120	15	M10	
GTH(K)-220	85~125	1AWG	35-50	23	M12	
	100~160	00AWG	35-70	23	M12	
	120~180	000AWG	50-95	23	M12	
	160~240	250AWG	70-120	23	M12	
	200~300	400AWG	95-185	23	M12	
	260~400	500AWG	150-240	23	M12	
	200~300	400AWG	95-185	57	M16	
	260~400	500AWG	150-240	57	M16	
GTH(K)-400	400~600	N° 2 40×5	150-185	57	M16	
	520~800	N° 2 60×5	185-240	57	M16	
	GTH(K)-600	400~600	N° 2 40×5	150-185	57	M16
		520~800	N° 2 60×5	185-240	57	M16

# Technical information

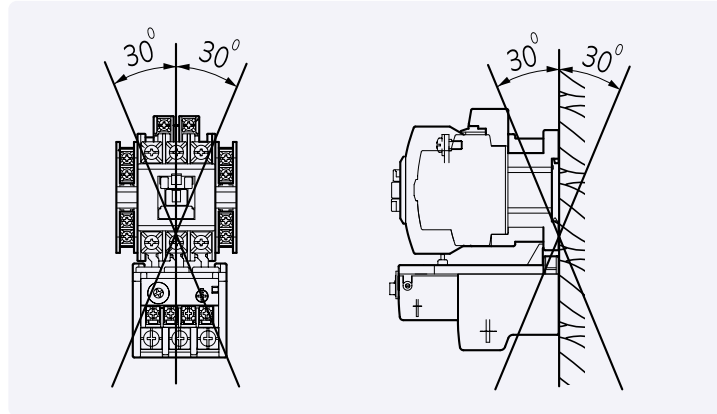
## Terminal dimensions

Type	Dimensions of terminal				Type	Dimensions of terminal			
	Main circuit		Auxiliary circuit			Main circuit		Auxiliary circuit	
	Terminal screw	A × B × C (mm)	Terminal screw	A × B × C (mm)		Terminal screw	A × B × C (mm)	Terminal screw	A × B × C (mm)
GMC-9(/4)	M4	9.5 × 5 × 4.9	M3.5	8 × 5 × 4.9	GTH(K)-22	M4	10 × 6.5 × 5	M3.5	7.8 × 4.3 × 7.3
GMC-12(/4)	M4	9.5 × 5 × 4.9	M3.5	8 × 5 × 4.9					
GMC-18(/4)	M4	9.5 × 5 × 4.9	M3.5	8 × 5 × 4.9					
GMC-22(/4)	M4	9.5 × 5 × 4.9	M3.5	8 × 5 × 4.9					
GMC-32(/4)	M5	12.4 × 6.5 × 6	M3.5	8 × 5 × 4.9	GTH(K)-40	M5	12.4 × 6.2 × 6.3	M3.5	7.8 × 4.3 × 7.3
GMC-40(/4)	M5	12.4 × 6.5 × 6	M3.5	8 × 5 × 4.9					
GMC-50(/4)	M6	17.5 × 7 × 8.7	M3.5	8 × 5 × 4.9	GTH(K)-85	M6	19 × 8.5 × 9	M3.5	7.8 × 4.3 × 7.3
GMC-65(/4)	M8	17.5 × 7 × 8.7	M3.5	8 × 5 × 4.9					
GMC-75(/4)	M8	17.5 × 7 × 8.7	M3.5	8 × 5 × 4.9					
GMC-85(/4)	M8	17.5 × 7 × 8.7	M3.5	8 × 5 × 4.9	GTH(K)-125	M8	15 × 9.5 × 9	M4	8.2 × 4.1 × 5.2
GMC-100(/4)	M8	15 × 8.5 × 9.5	M4	10.8 × 4.1 × 4.1					
GMC-125(/4)	M8	15 × 8.5 × 9.5	M4	10.8 × 4.1 × 4.1	GTH(K)-150	M8	20 × 10 × 10	M4	8.2 × 4.1 × 5.2
GMC-150(/4)	M8	20.5 × 10 × 9	M4	10.8 × 4.1 × 4.1					
GMC-180(/4)	M10	25 × 12.5 × 15	M4	10.8 × 4.1 × 4.1	GTH(K)-220	M10	25 × 12.5 × 13.5	M3.5	7.7 × 5 × 4.5
GMC-220(/4)	M10	25 × 12.5 × 15	M4	10.8 × 4.1 × 4.1					
GMC-300(/4)	M12	30 × 14.5 × 20	M4	10.8 × 4.1 × 4.1	GTH(K)-400	M12	30 × 15 × 11	M3.5	7.7 × 5 × 4.5
GMC-400(/4)	M12	30 × 14.5 × 20	M4	10.8 × 4.1 × 4.1					
GMC-600(/4)	M16	40 × 20 × 40.5	M4	10.8 × 4.1 × 4.1	GTH(K)-600	M16	30 × 11.2 × 23.2	M3.5	7.7 × 5 × 4.5
GMC-800(/4)	M16	40 × 20 × 40.5	M4	10.8 × 4.1 × 4.1					

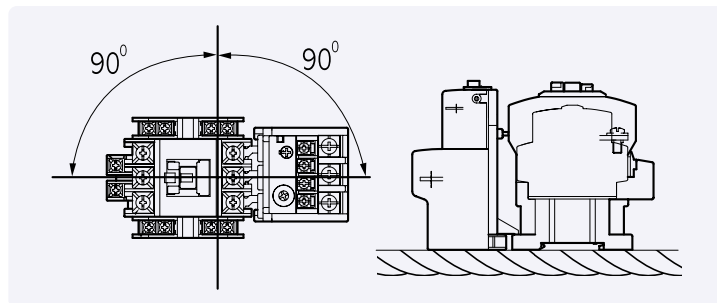


## Installation

### 1) Operating position



Normal installation

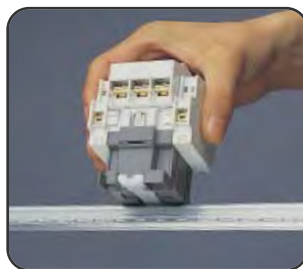


Horizontal or vertical installation

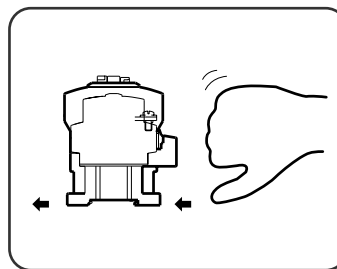
- In special installations, the endurance and other characteristics may be deteriorated.

## DIN rail(GMC-9~85)

- 35mm DIN rail



Installation



Un-install

## Environment

- 1) Ambient temperature
  - -25~40°C
- 2) Storage temperature
  - -30~65°C
- 3) Altitude : below 2,000m
- 4) Do not install below freezing point.

# Technical information

## Ratings & Performance of contactors with delayed opening device

### Ratings

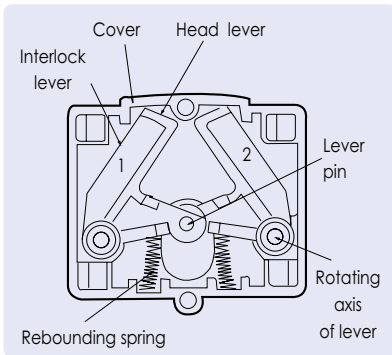
Type		Rate power(kw)			Rated current (A)			Ith AC 1 (A)	Aux. contact
		(AC 3)			(AC 3)				
Delay open device	Applied contactor	200~240V	380~440V	500~550V	200~240V	380~440V	500~550V		
AD - 9	GMD - 9	2.5	4	4	11	9	7	20	1NO1NC
	GMD - 12	3.5	5.5	7.5	13	12	12	20	
	GMD - 18	4.5	7.5	7.5	18	18	13	25	
	GMD - 22	5.5	11	15	22	22	22	32	
	GMD - 32	7.5	15	18.5	32	32	28	50	
AD - 50	GMD - 40	11	18.5	22	40	40	32	60	2NO2NC
	GMD - 50	15	22	30	55	50	43	80	
	GMD - 65	18.5	30	37	65	65	60	100	
	GMD - 75	22	37	45	75	75	64	110	
AD - 100	GMD - 85	25	45	45	85	85	75	135	2NO2NC
	GMC - 100	30	55	55	105	105	85	150	
	GMC - 125	37	60	60	125	120	90	150	
	GMC - 150	45	75	90	150	150	140	200	
	GMC - 180	55	90	110	180	180	180	230	
AD - 300	GMC - 220	75	132	132	220	220	200	260	2NO2NC
	GMC - 300	90	160	160	300	300	250	350	
AD - 600	GMC - 400	125	220	225	400	400	350	420	2NO2NC
	GMC - 600	190	330	330	630	630	500	660	
	GMC - 800	220	440	500	800	800	720	800	

### Performance

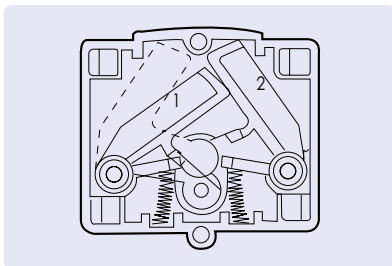
Type	Max. permissible current (A) (AC.3)	Frequency	Endurance		Delay time	Condenser endurance	Operational voltage
			Mec.	Ele.			
GMD - 9~40 + AD - 9 GMD - 50~85+AD - 50 GMC - 100~220 + AD - 100 GMC - 300~400 + AD - 300 GMC - 600~800 + AD - 600	Short circuit : Over 10 × I <sub>n</sub>  Breaking : Over 8 × I <sub>n</sub>	600  Operations/ hour	5Mil.	1Mil.  0.5Mil.	1~4sec	<40°C : 100,000 <45°C : 80,000 <50°C : 60,000	AC 200~220V 50Hz / 60Hz



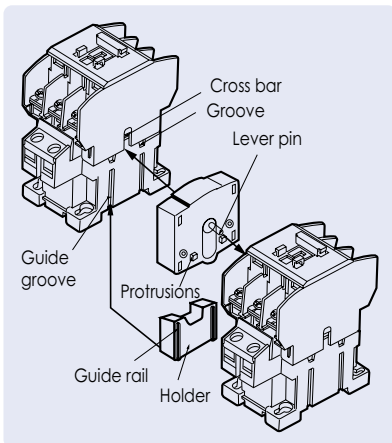




(a) Open state



(b) Interlocked



## Structure

- GMC(S)-9R~85R are Din-rail mounting type
- The mechanical interlock is common in GMC(S)-9R ~ 85R

## Operation

- Open state  
When the two contactors are in the “OFF” position, the lever maintains it’s “OPEN” state by rebounding springs.
- Interlocking  
When a any one of the contactors are energized, as the lever pin comes down by the crossbar, the interlock lever revolves around it’s axis of rotation and the heads of levers 1 and 2 are interlocked.
- Releasing  
If one of the two contactors is de-energized, crossbar comes up by the power of kick out spring, and then interlock lever goes up by the cross bar, and added with the power of rebounding springs, the interlock lever gets pushed up to the open position.

## Handling

- The electrical interlock should be commonly connected to the “NC” contacts of the two contactors.
- Do not install horizontally



# Technical information

## Operational Characteristics of Latching Contactors

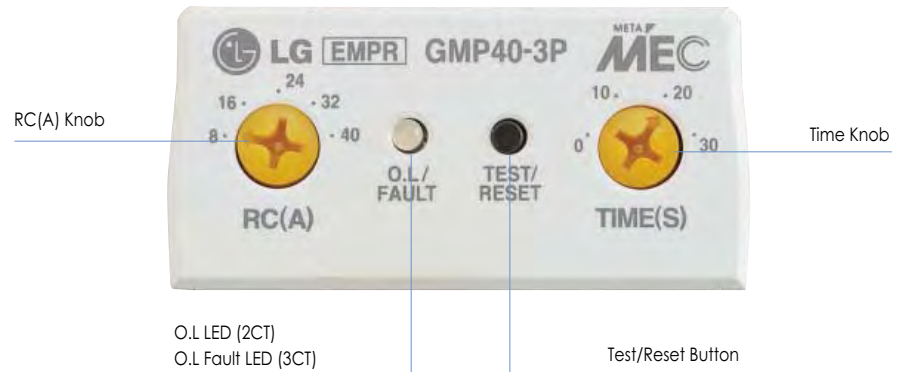
### Operational characteristics

Type	Consumption (VA)		Operational voltage (V)		Operational time (ms)		Transformer consumption (VA)
	Close	Open	Close	Open	Close	Open	
GMC - 9L,12L,18L,22L	100	90	160	45	15	11	40~60
GMC - 32L,40L	100	90	160	45	15	11	40~60
GMC - 50L,65L,75L,85L	120	100	160	45	30	15	40~60
GMC - 100L,125L	298	500	80	150	30~34	10~25	500
GMC - 150L	298	500	80	150	37~41	10~25	500
GMC - 180L,220L	380	500	80	150	45	10~25	500
GMC - 300L,400L	571	500	80	150	45~50	10~25	500

Note) AC220V, 60Hz The operational times are the average values after coil is energized



## Operating and setting method



### 1. Check the rated voltage and apply the control power to A1 and A2 terminal

Do not apply 220V to 110V use model

### 2. Check the TEST/RESET button operation

Check the operation of the output contact

- 1) Check if the control voltage and wiring method is correct (Refer to the wiring diagram)
- 2) When you press the 'Test/Reset' button, the 'O.L LED' is turned on and the EMPR is tripped
- 3) When you press the 'Test/Reset' button under the EMPR is tripped, the 'O.L LED' is turned off and the EMPR is reset
- 4) Auto reset function: When it is tripped by the over current, it is reset after 1 Min.(Optional)

**Caution)** For safety, when the motor is operating the 'Test/Reset' button do not work

### 3. Set the operating time

The operating time is set on the base of 600% of the rated current in the characteristic curve

- 1) Set the operating time by considering the operating time and start current according to the types of the load  
(Ex.: If the start current is 600% of the normal operation current and the starting is 10sec, set the time knob around 11~12sec. with 10~20%margin)
- 2) Operating time range is 0~30sec
- 3) If the time knob is set to 10sec, the EMPR is tripped when the start current (600% of the rated current) is applied for 10sec

**Caution)** The EMPR with inverse time characteristics can be tripped to protect the motor when the motor is started a few times continuously When a motor is frequently changing the rotating direction (forward and reverse), set the operating time longer For the crane and hoist use, select the EMPR with definite time characteristics

### 4. Set the operating current

Set the current by considering the rated current of a motor to protect from the over current

- 1) Check if the rated current of a motor is within the current setting range of an EMPR
- 2) Set the 'RC' (Rated current) knob to the maximum value and then start a motor
- 3) Under normal motor operation, rotate the 'RC' knob to the counterclockwise until the 'O.L.' LED turned on&off The current at this point in the 100% current rating under real load
- 4) At this point, rotate the 'RC' knob to the clockwise until the 'O.L.' LED turned off. In general case the setting value is around 110~120% of the rated current  
Ex) When the 'O.L.' LED flickering at 20A, the setting current will be 22A(=20x1.1)

**Note)** The brackets for connection is offered standard

# Technical information

## Setting method (Inverse time characteristics)

### 5. Check status of operation by LED

1) In case of overcurrent

If there will be an overcurrent during motor operation, the red color of LED will flicker at 0.4 second intervals. After tripping because of overcurrent, the red color of LED will light up.

2) In case of phase failure

If there will be a phase failure in three phase load, it will be tripped within 3 seconds.

In case of R phase failure, green color of FAULT LED will flicker at 3 second intervals.

In case of S phase failure, at 3 second intervals, green color of FAULT LED will flicker two times.

In case of T phase failure, at 3 second intervals, green color of FAULT LED will flicker two times.

**Note)** 2CT EMPR can protect motor from R or T phase failure.

3) In case of phase unbalance

- If phase unbalance rate is over 50%, FAULT LED will flicker 0.4 second intervals.

4) In case of Reverse phase

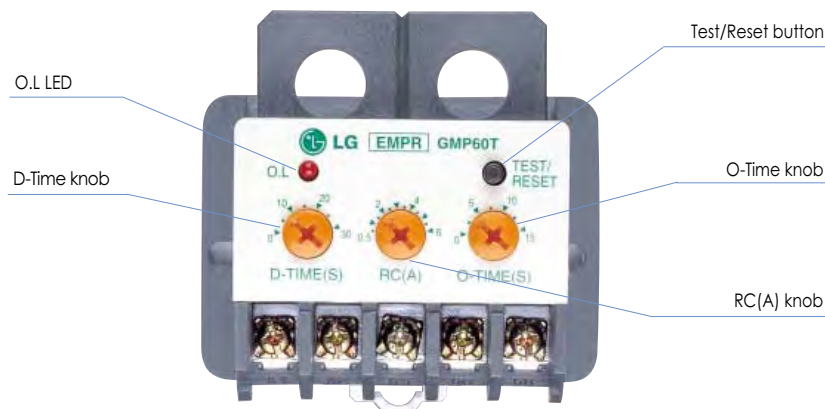
- Red & green color LED will flicker alternately.

5) Status of LED operation

Condition		LED Status	LED Diagram	Remark	
Operating status	Normal	LED OFF			
	Overcurrent	0.4 Second intervals			
	Phase unbalance (30~50%)	0.4 Second intervals		In case of GMP 80-3S/3SR model, only red color LED will flicker.	
Tripped status	Overcurrent	O.L LED light up			
	Phase failure (3CT)	R	1 time for 3 seconds		In case of GMP 80-3S/3SR model, O.L LED will light up and also FAULT LED will flicker.
		S	2 time for 3 seconds		
		T	3 time for 3 seconds		
	Phase failure (2CT)	Red LED light up for 0.9 sec LED goes off for 0.1 sec			
	Reverse phase (2CT)	Red & Green color LED flicker alternately			

**Note)** There are two red color LEDs for O.L (Overload) & Fault in the model of GMP 80S/3SR.

## Operating and setting method



## Tunnel type mounting

### 1. Check the Test/Reset button operation

#### Check if the EMPR operate in overcurrent

- 1) Check if the wiring is correct (Refer to the wiring diagram)
  - 2) Set the 'D-Time' and 'O-Time' knob to the min. ratings
  - 3) When the 'Test' button is pressed under tripped condition, the 'O.L' LED is turned off
  - 4) When you press the 'Test' button again then the lamp turned off and the EMPR reset
- Note)** In operation, even though you press the 'Test/Reset' button, the EMPR do not trip

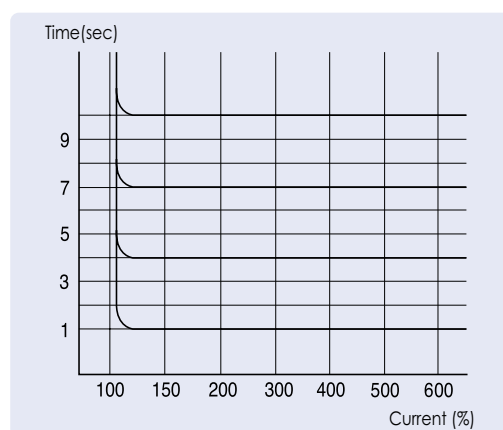
### 2. Set the operating time (Definite time characteristics)

#### ● D-time (Delay time) : 0.2~30 sec

The motor starting current, which flows when the motor is starting, is generally 600~800% of the rated current and the delay time varies according to the load condition. It is the time during which the EMPR do not operated by over-current during the starting time

- 1) Set the delay time by use of the 'D-time' knob
- 2) In case you do not know the delay time, start the motor by setting the 'D-time' knob to the max. position and after checking the time during which the starting current become stable, set the D-time (In general pump, the setting time is 3~5 seconds)

**Note)** The time delay is forced time delay type, therefore if you make a mistake to select the time, the motor may be burn



Definite time characteristics curve

#### ● The operating time is the time during which the EMPR tripped by the over-current. The EMPR is tripped after the selected operation time

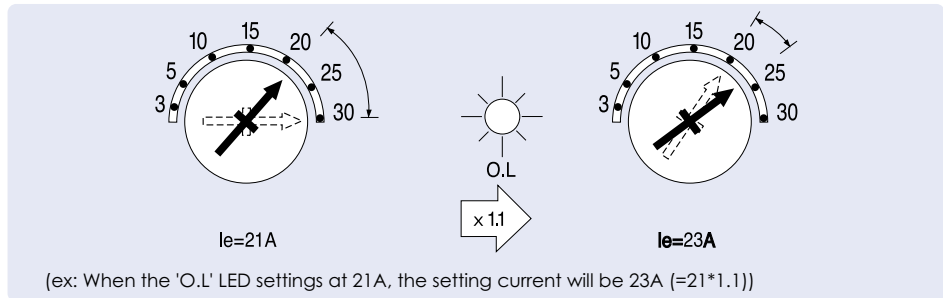
- 1) Set the operation time by the 'O-time' knob
- 2) In special case such as for mechanical shock relay, if you set the 'O-time' to the min value, the EMPR is tripped at once

**Note)** Generally set it to 4~6 seconds

### 3. Set the operating current (Similar to that of the pin type & screw type)

● Set the operation current to protect from over current. Set the current by considering the rated current

- 1) Start the motor by setting the 'RC' knob to the maximum position
- 2) Under operating condition, rotate the 'RC' knob to the counterclockwise until the 'O.L' LED turned on & off. The current at this point is the value (100%) under real load condition
- 3) Rotate the 'RC' knob to the clock-wise until the 'O.L' LED turned off. In general case the setting is 110~120% of the rated current



### 4. Check the LED condition when operation

- 1) Over-current
  - The EMPR is not tripped during the D-time under over-current but the O.L LED turned on and off to indicate that the over-current flows
  - If the EMPR is tripped after D-time the O.L LED turned on
- 2) Phase failure
  - If a motor does not rotate under phase failure, the high current may flows. At this time a motor is protected by the over-current protection function

Condition	Red O.L LED		Note
	Off	On	
Operation normal	Off		
Overcurrent	On & Off		On & Off under over current
Trip over-current	On		The EMPR is tripped

### Motor selection

Nominal current	Current setting range(A)	220~240VAC			440~480VAC		
		3 phase motor ratings kW(Hp)	Full load current (A)	3 phase motor ratings kW(Hp)	Full load current (A)		
1.5	0.3-1.5	~0.18	(~0.25)	1.5	0.12~0.55	(~0.75)	1.6
5	1-5	0.18~0.75	(0.25~1)	4.8	0.25~1.5	(0.33~2)	4
22	4.4-22	1.1~4	(1.5~5.5)	18.8	3~11	(4~15)	24
20	4-20	0.75~3.7	(1~5)	17.4	2.2~7.5	(3~10)	17
40	8-40	2.2~7.5	(3~10)	34	4~15	(5.5~20)	32.5
80	16-80	4~18.5	(5.5~25)	79	7.5~37	(10~50)	74
06	0.5-6	0.09~0.75	(0.13~1)	4.8	0.09~22	(0.13~3)	5.5
30	3-30	0.37~5.5	(0.5~7.5)	26	1.1~11	(1.5~15)	24
60	5-60	1.1~11	(1~15)	48	3~22	(4~30)	46.5

**Note)** The above values are the reference ones by AC3 class standard squirrel cage motor.  
The values may be changed according to the class and the manufacturer of a motor.

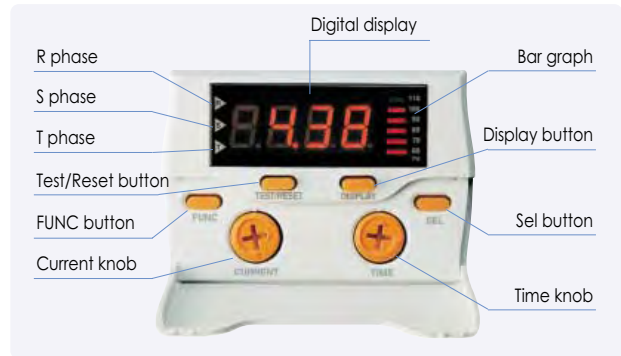
## Before operating a motor, set the D-EMPR as follows

### 1. Check the operation of the Test/Reset button

- Check the operation when it is tripped

- 1) Check the wiring method (Refer to P147~148)
- 2) Press the Test/Reset button and then test is displayed on the LED and the DMPR is tripped
- 3) Press the Test/Reset button again and then it is reset

**Note)** In order to avoid the trip fault, the push operation of Test/Reset is not available when a motor is rotating.



### 2. Shift the mode by pressing the FUNC key and then select the values by press the Sel key

- You can finish the setting by pressing the Sel key in the Sto mode
- To protect the operation under the motor rotating, setting is allowed only in the test mode

FUNC	Sel	Functions	Note
1.CHA	1 nu/dEF	Inverse or definite time characteristics	Default is inverse time characteristics
2.dEF	0~30	Set the O-time (Definite time only)	For D-time setting, use the time knob
3. r.P	oFF/on	Reverse phases protection	Default is "Off"
4.Und	oFF/30~70 (%)	Under current protection	Default is "Off" <b>Note1)</b>
5.ALt	oFF/60~110 (%)	Alarm function (With pre-alarm function)	Default is "Off"
5.g-F	oFF/0.05~1 (SEC)	Ground fault and Setting the operating time	Default is "Off" (Z type)
6.StL	oFF/on	Stall function	Default is "Off"
7.Loc	oFF/200~900 (%)	Lock function	Default is "Off"
8. Ct	1~120	CT ratio	Default is 1:1 <b>Note2)</b>
9.P-F	on/oFF	Phase failure	Default is "On" to store
A.gFd	oFF/on	Setting delay of Ground Fault	Available for SZa/TZa
b.StA	1~120	Operating time setting (Month)	Available for Sa/Ta/SZa/TZa
c.StH	10~730	Operating time setting (Hour)	
d.tAH	A000,000.0	Displaying total operating time (Month, Hour)	
E.rAH	A000,000.0	Displaying operating time (Month, Hour)	
Sto	Sto	Store	Push the SEL button to store

**Note1)** Set the under current value from above 350mA

**Note2)** Do not change the CT ratio in 60 type (Default is 10:1)

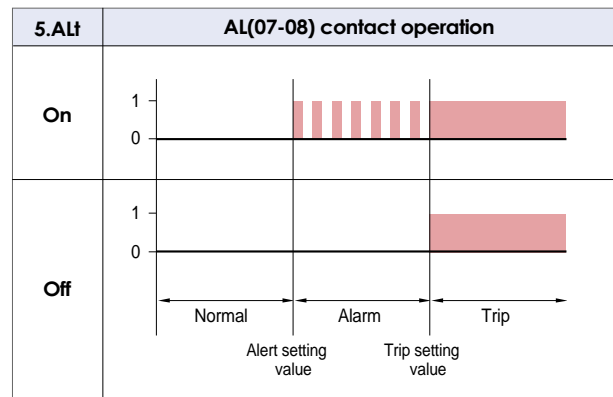


# Technical information

## Setting method

- 1) First shift to the test mode by press the "Test/Reset" button and then set the functions by press the "FUNC" button
- 2) Each time you press the "FUNC" button, the function mode switches from 1.CHA mode to Sto mode.  
When the mode that you want to change is displayed, push the "Sel" button to select the value you want.  
After you select the value, press the "FUNC" button to finish the settings and it displays the next mode
- 3) If no button is pressed in the selection mode, it remains in that mode
- 4) If you select the inverse time characteristics it skips the mode 2 (Definite O-time) and go to the mode 3 (Reverse phase)
- 5) Alt is the alert setting mode. It displays the load rate of the current setting value by the bar LED (60~110%)
  - If the current is higher than the setting value, the bar LED is switched on and off and the AL relay(07-08) make close and open in 1sec interval unit the EMPR is tripped (Pre-alarm function)
  - If the 5. Alt mode is set to off, the AL relay make close after the EMPR is tripped (Normal open contact)
- 6) To finish the settings you have to press the "Sel" button in the Sto mode

### Alarm signal (Alert function)



### 3. Adjust the operating time by the time knob



#### ● Inverse time characteristics

- 1) Select the inverse time in the 1. CHA mode, the default operating time is 600% of the rated current
- 2) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
- 3) When it is over the setting time, the EMPR operate in accord with the hot curve

#### ● Definite time characteristics

- 1) Select the definite in the 1. CHA mode, it is operated by the definite time characteristics
- 2) D-time means the time that delays the operating time when the motor is starting
- 3) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
- 4) Set the O-time at the setting mode 2. dEF and the range is 0~30sec

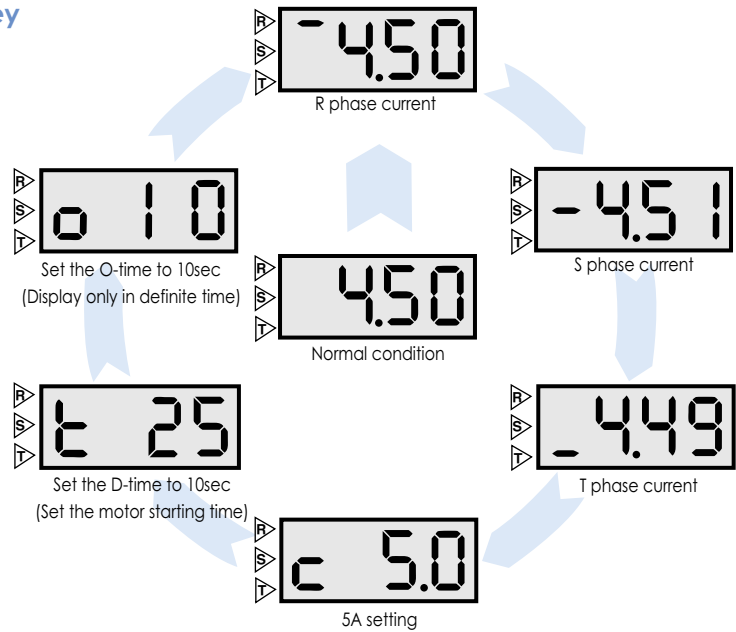
### 4. Adjust the operating current by the current knob

- 1) Set the operating current based on the rated current that is described in the name plate.  
Generally set the 110~115% of the real load current in the normal load condition
- 2) There are 2 CT types according to the current range (0.6 / 60). When you use the external CT you can see the real current by set the CT ratio (In 60CT type the default CT ration is 10:1)
- 3) You can easily set the current value by refer to the load rate which is displayed on the bar-graph (Approx. 90% load rate)



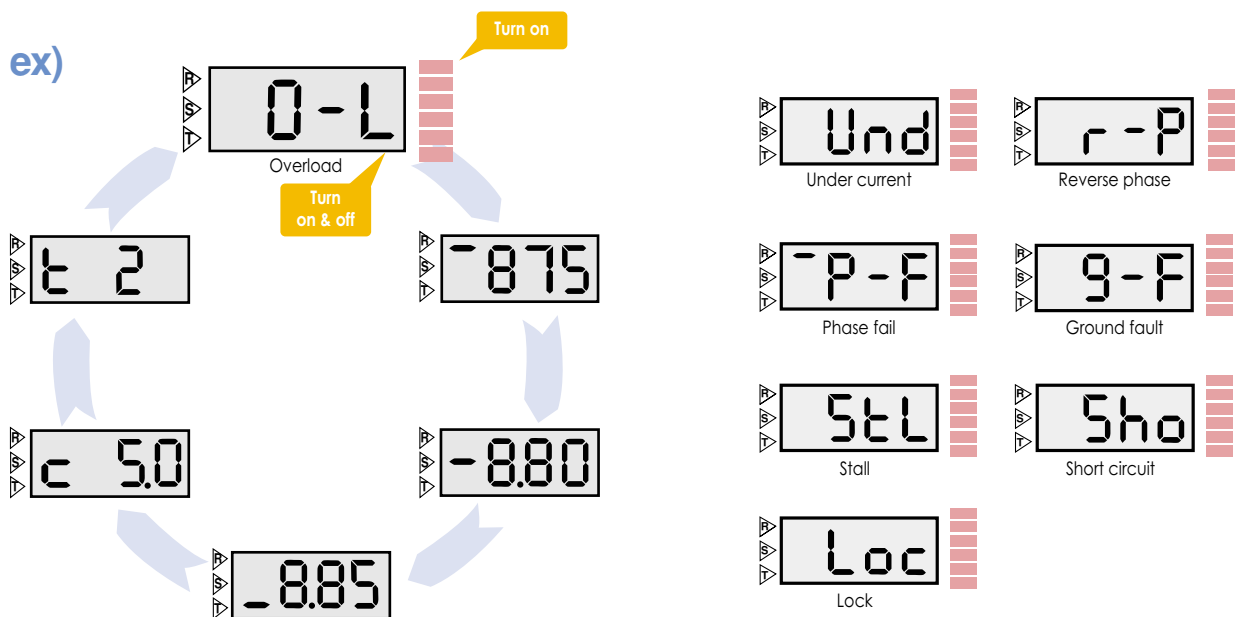
### 5. Check the setting state by the display key

- 1) In normal condition it display the maximum current among the three phase current
- 2) Each time you press the "Display" button you can see the current and values as PIG X
- 3) If no button is pressed for 3~4 seconds. It returned to the normal condition

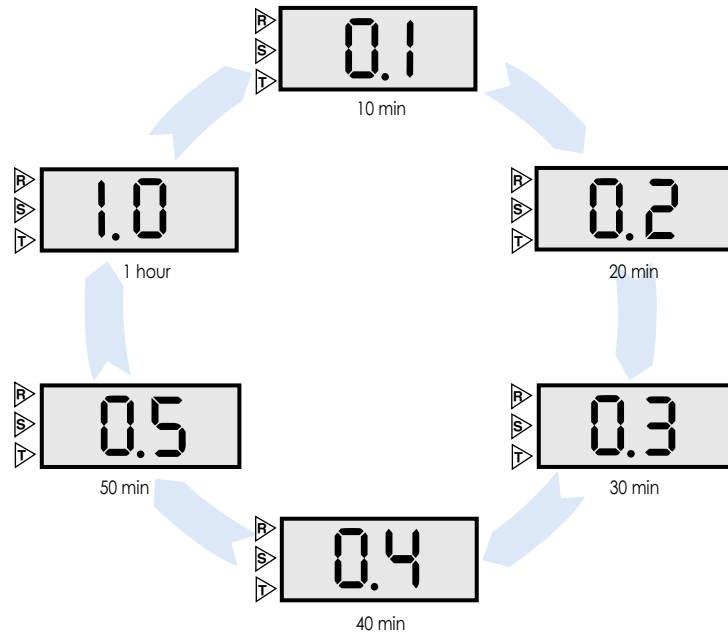


### 6. Check the causes of the fault by look at the display unit (7-segment)

- The causes of the fault is switched on and off for 0.5sec interval. If you press the "Display" button at this time, display you can see the values and the causes of the fault



### 7. How to check operating time for Sa/Ta/SZa/STa



- Operating time will be displayed as shown in the above diagram.
- As shown in above diagram, it will show 1.0 after 0.5 instead of 0.6. And, it means 1 hour.  
ex) 1.4 → 1hr 40min, 3.2 → 3hr 20min  
8.5 → 8hr 50min, 4.5 → 4hr 50min  
6.2 → 6hr 20min, 2.1 → 2hr 10min

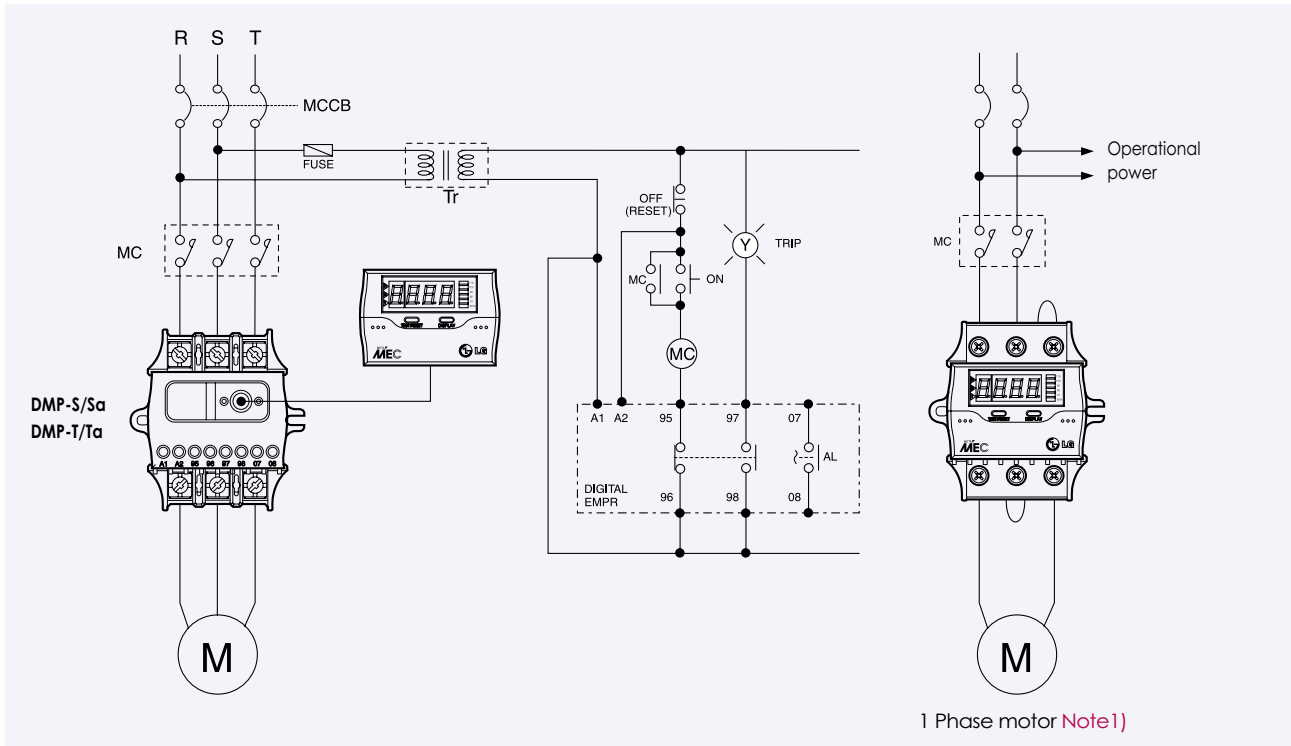
- The following will not be shown.

XX.6 XX.7 XX.8 XX.9

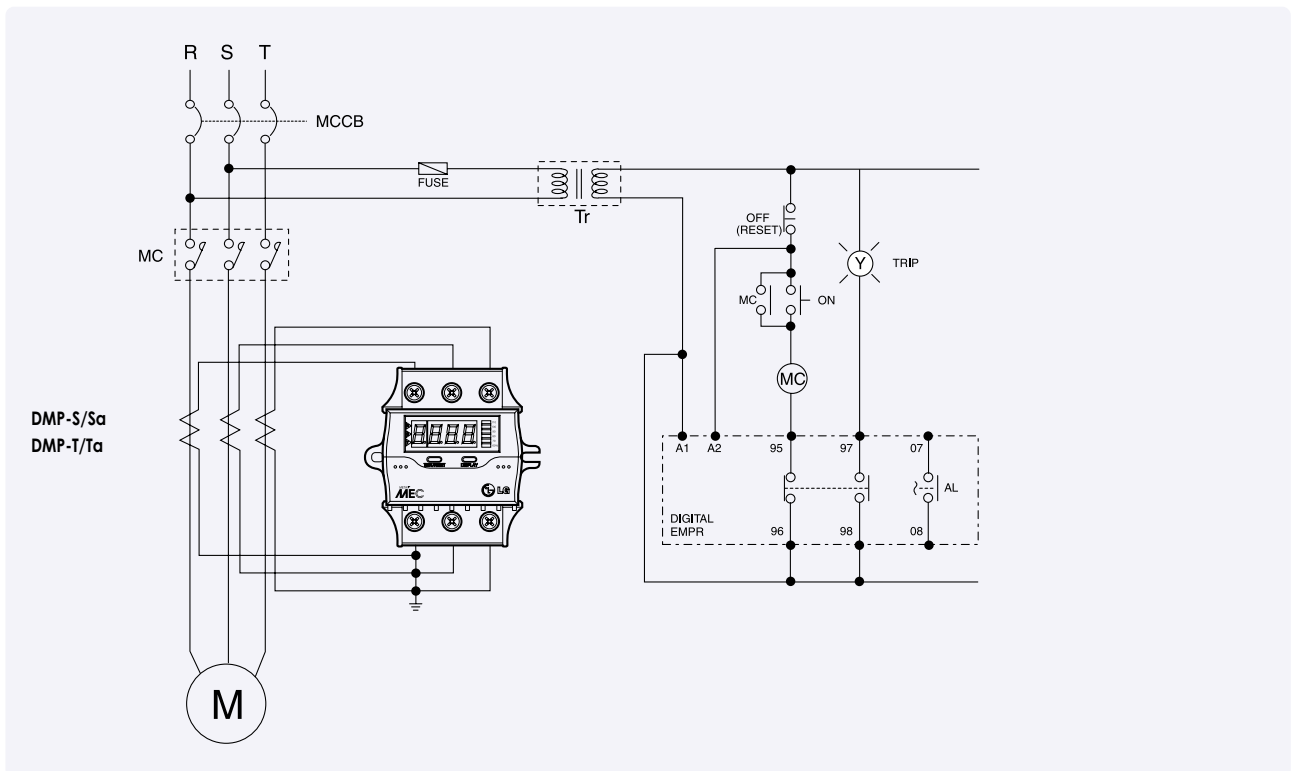
ex) 1.6(×), 2.8(×), 3.9(×), 4.7(×)



## Wiring method



## External CT combination

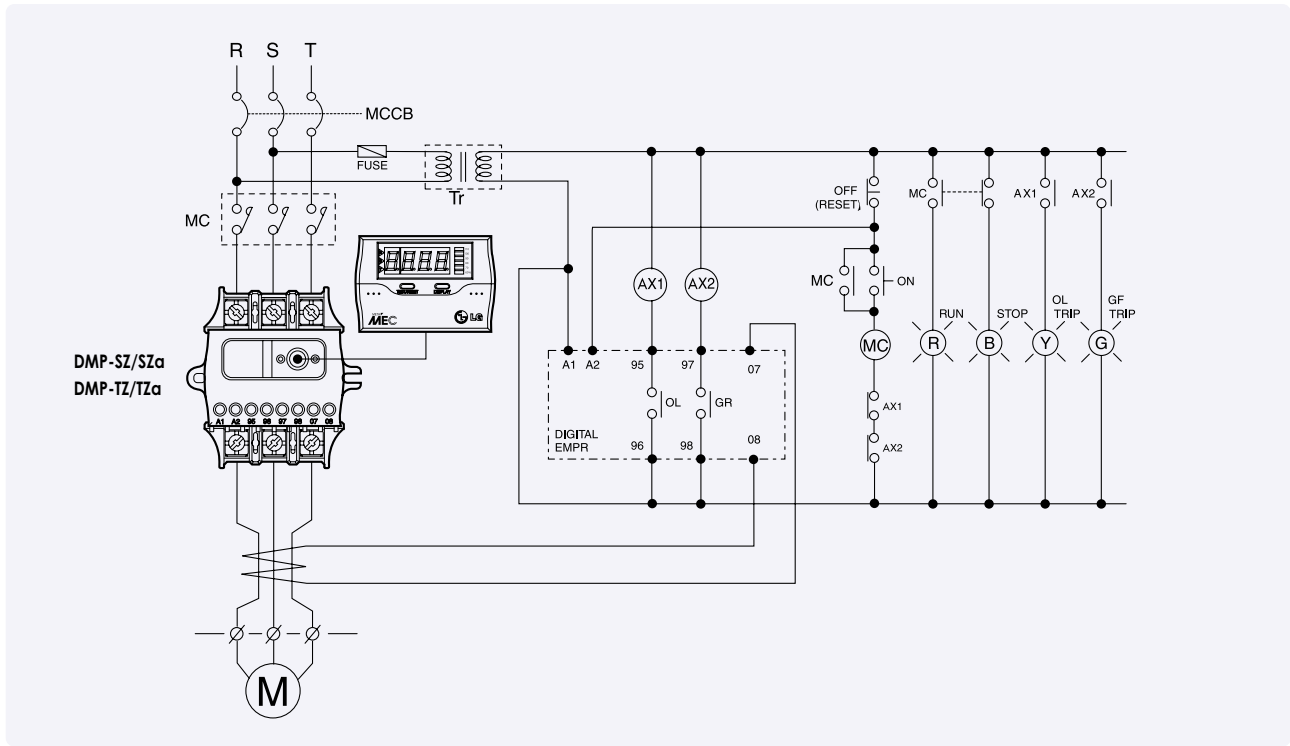


Note1) Please turn off the reverse phase function when it is used for 1 phase motor

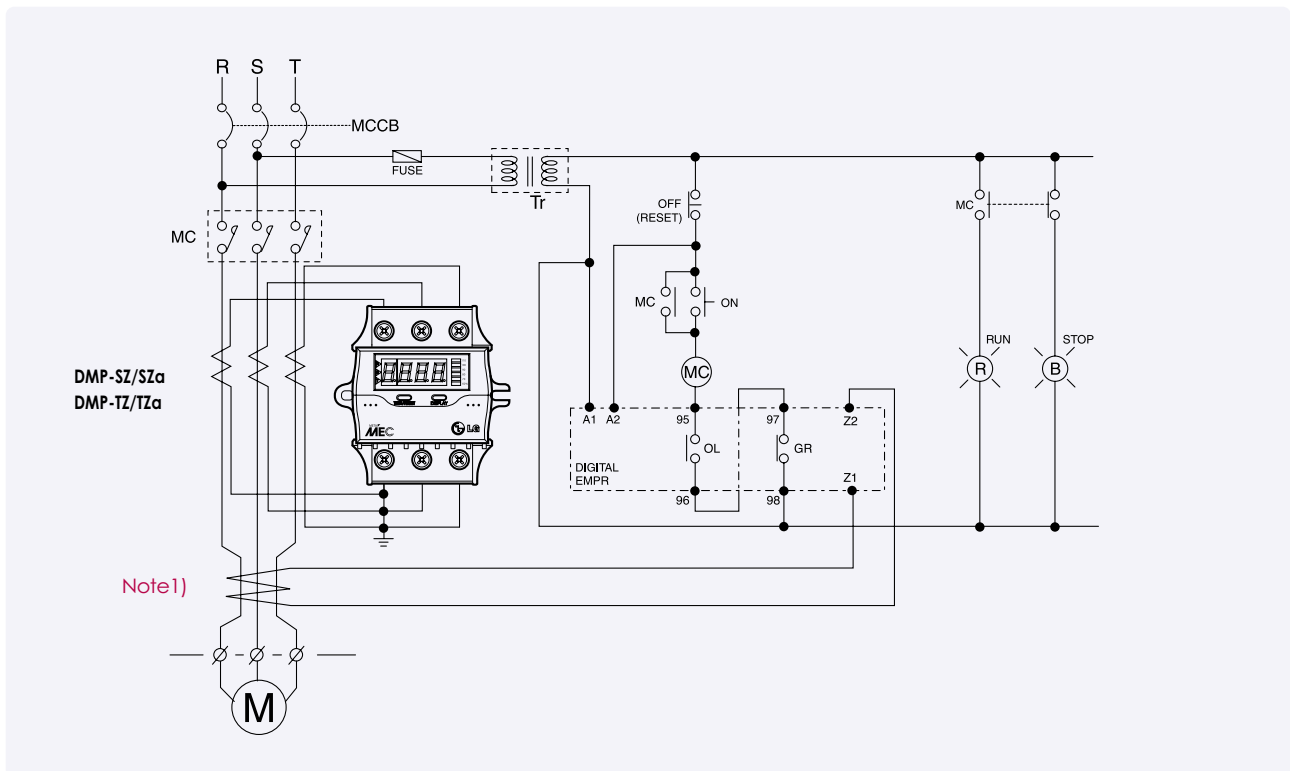
# Technical information

## Wiring method

### Wiring method



### External CT combination



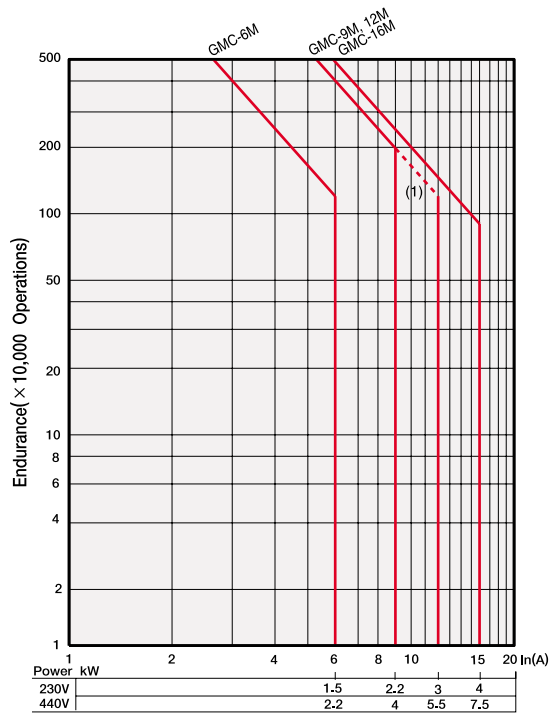
Note1)

Note1) Please turn off to page for zero-phase sequence current transformer.

## Electrical lifespan of contactors

Use in category AC-3

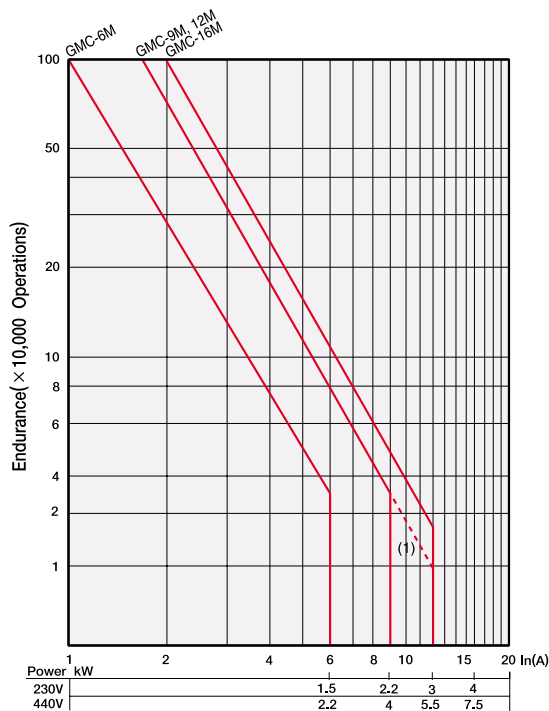
( $U_e \geq 440V$ )



(1) The dotted lines are only applicable to GMC-12M contactors.

Use in category AC-4

( $U_e \geq 440V$ )

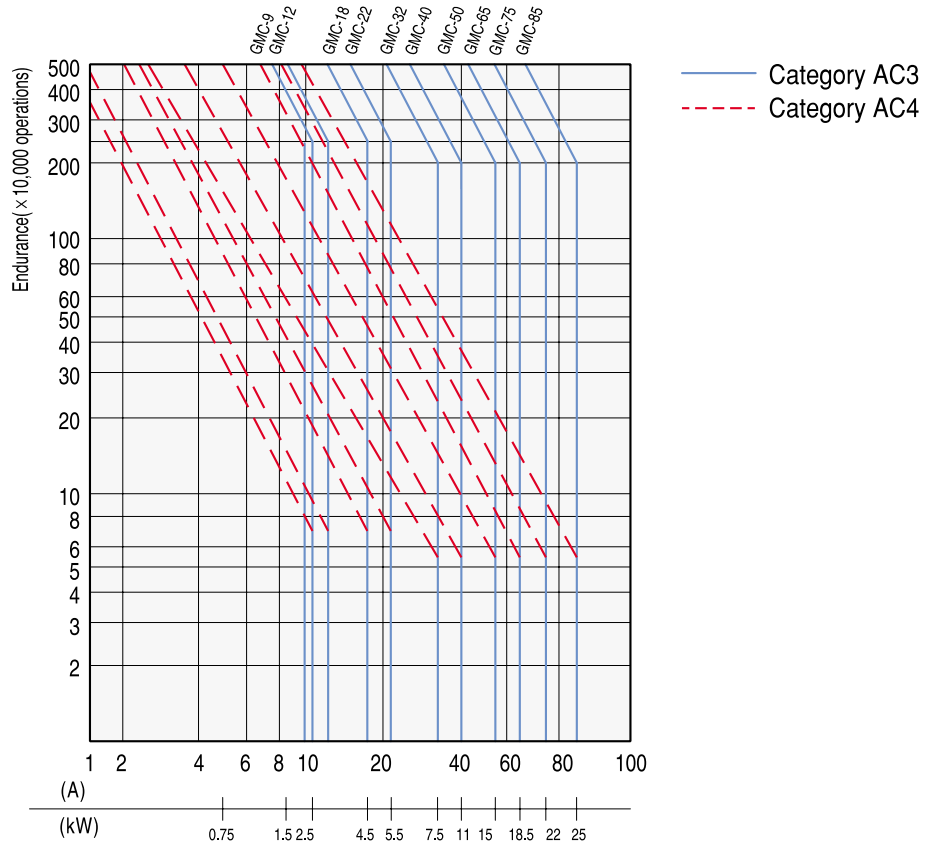


(1) The dotted lines are only applicable to GMC-12M contactors.

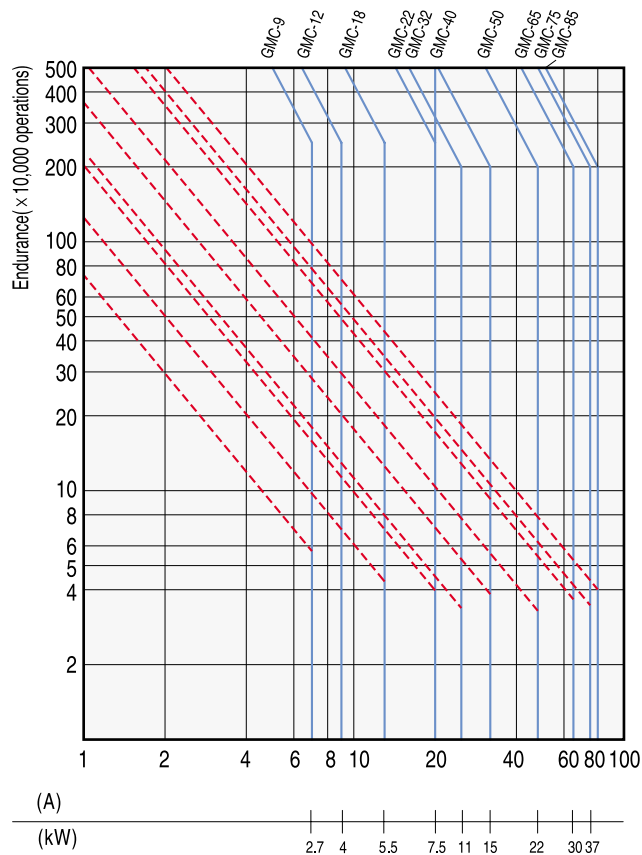
# Technical information

## Electrical lifetime : GMC-9 to 85

3 phase /  
AC 220~240V



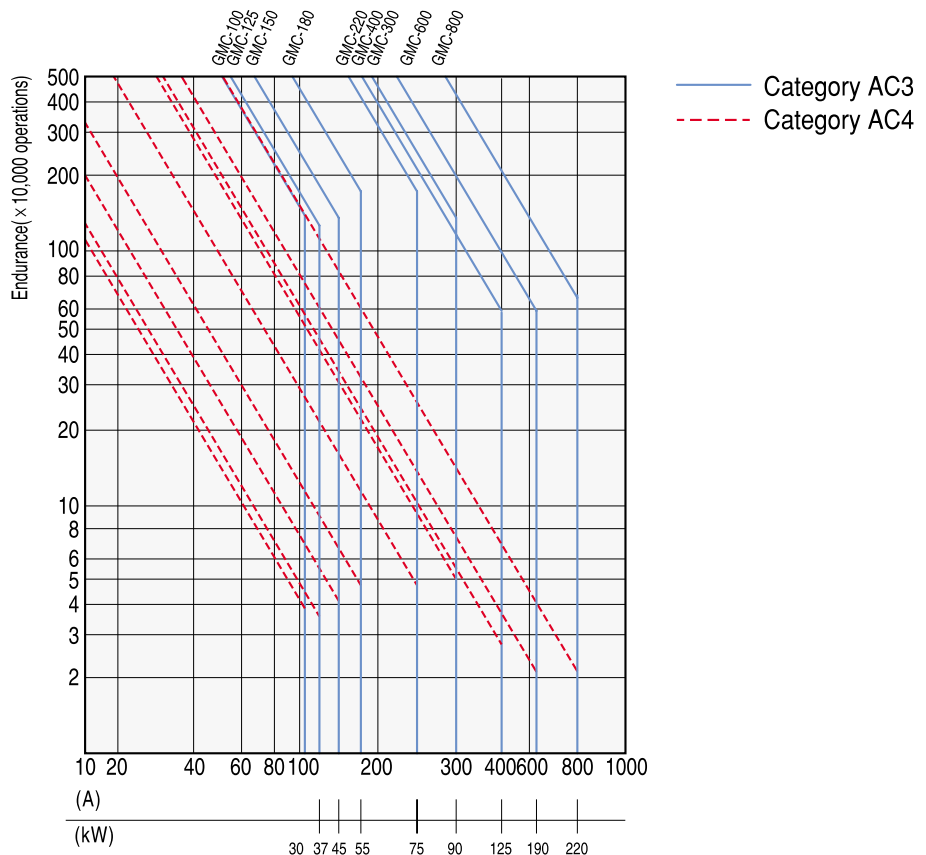
3 phase /  
AC 380~440V



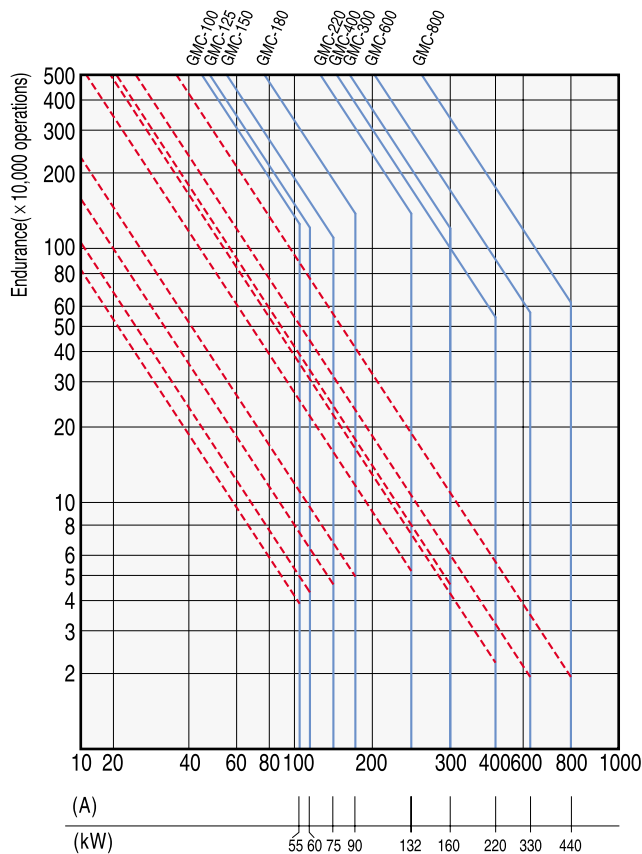
# Electrical lifetime : GMC-100 to 800



3 phase /  
AC 220~240V



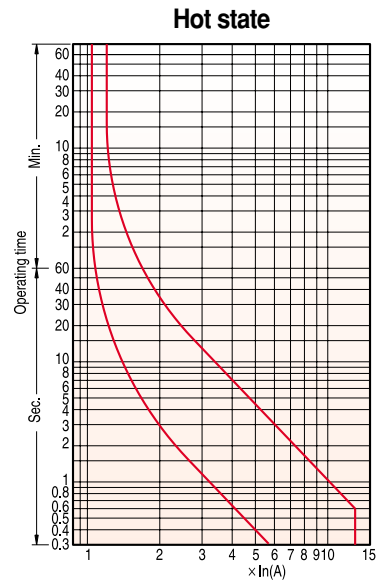
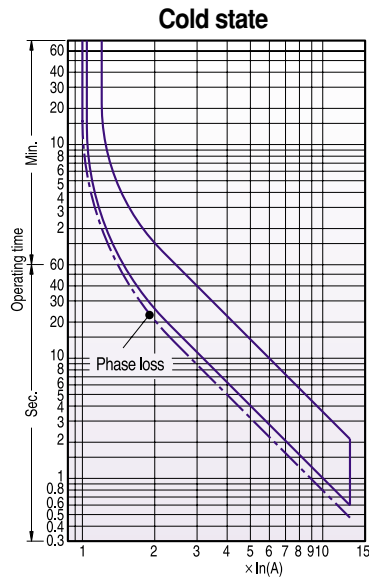
3 phase /  
AC 380~440V



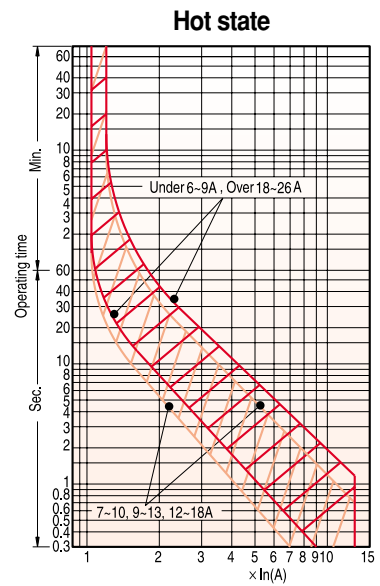
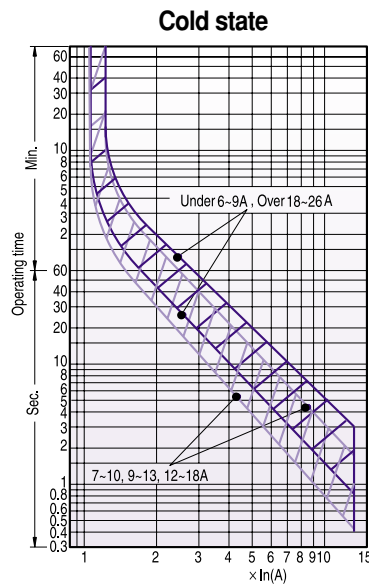
# Technical information

## Trip curves for thermal overload relays

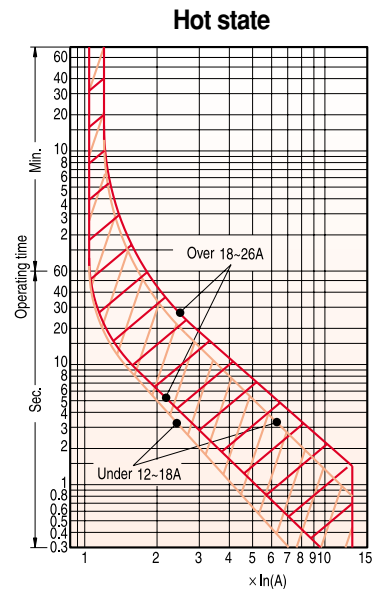
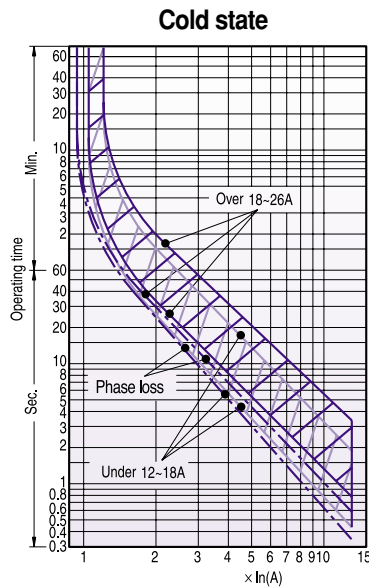
GTH(K)-22



GTH(K)-40



GTH(K)-85

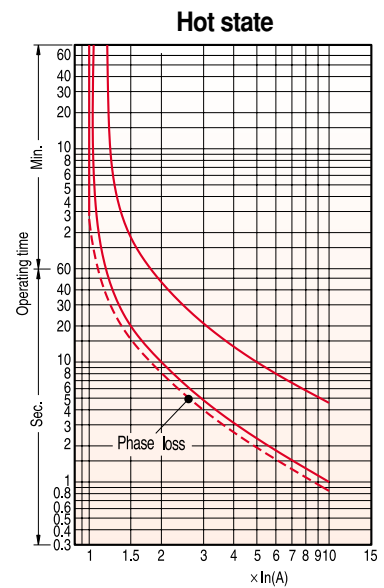
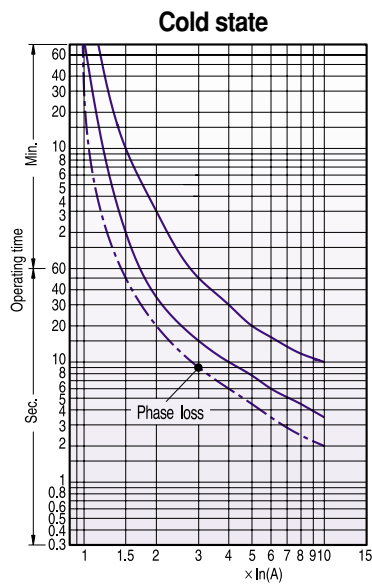




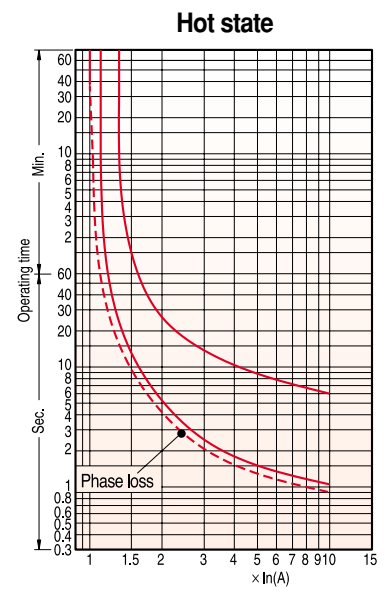
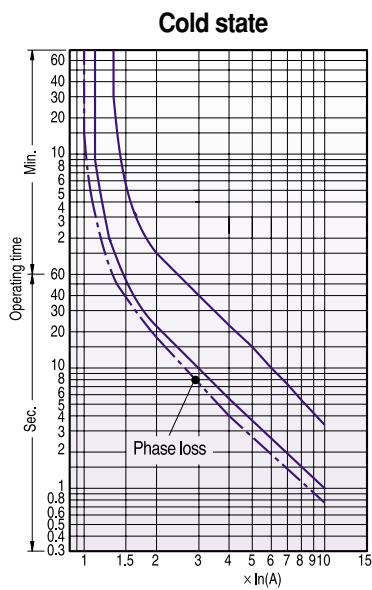
# Trip curves for thermal overload relays



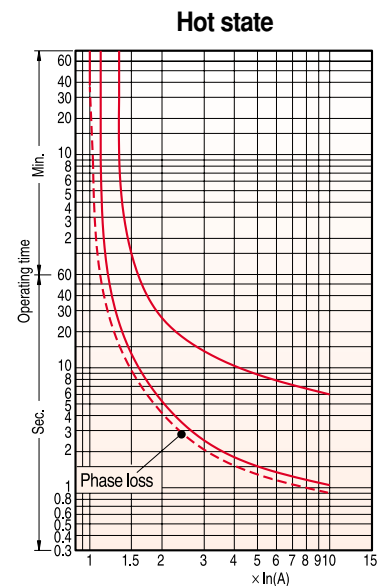
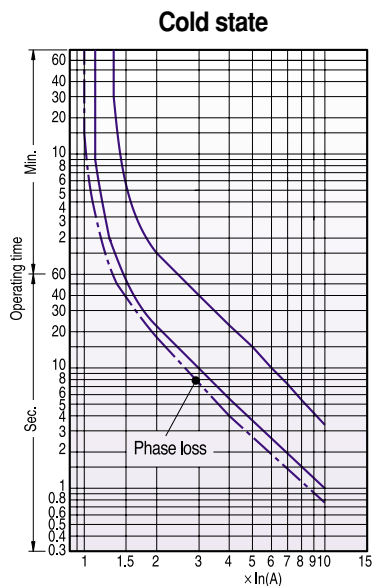
GTH(K)-100  
GTH(K)-150



GTH(K)-220  
GTH(K)-400



GTH(K)-600

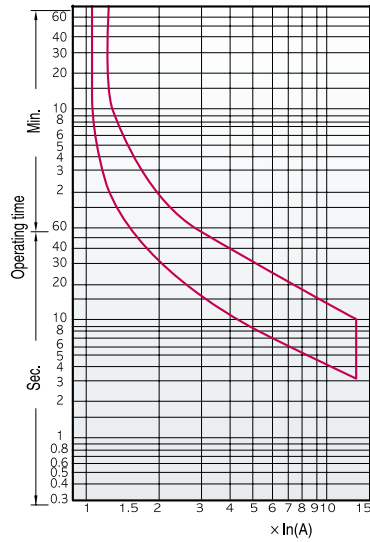


# Technical information

## Trip curves for thermal overload relays, Class 20

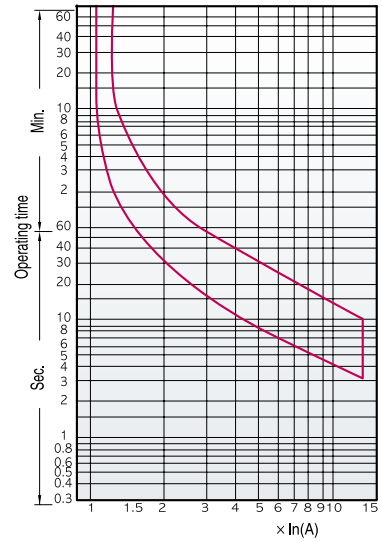
**GTK-22/L**

**Tripping characteristics**

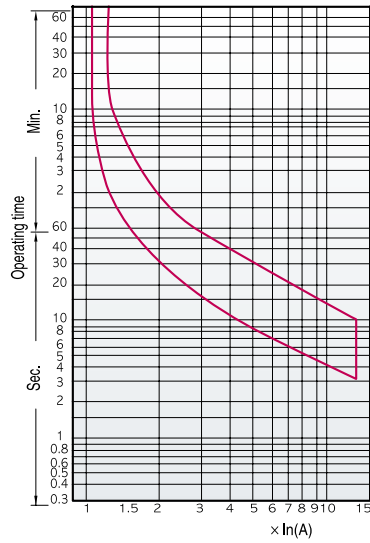


**GTK-40/L**

**Tripping characteristics**

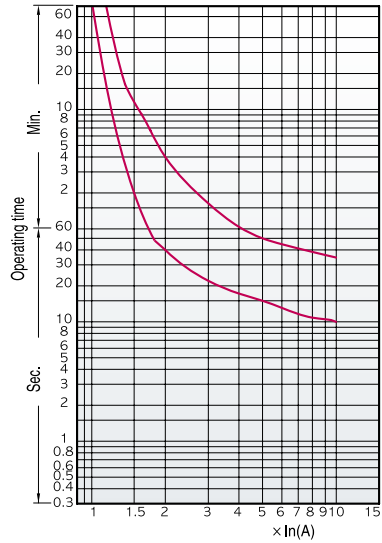


**GTK-85/L**



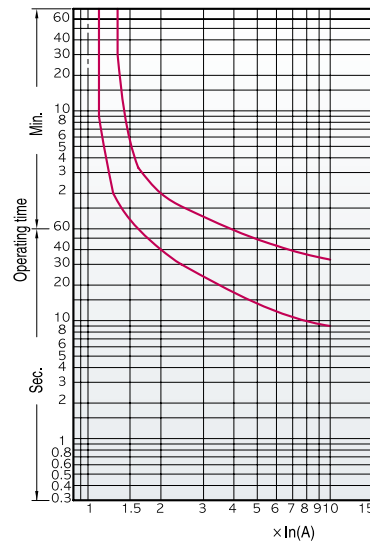
**GTK-100/L**

**GTK-150/L**

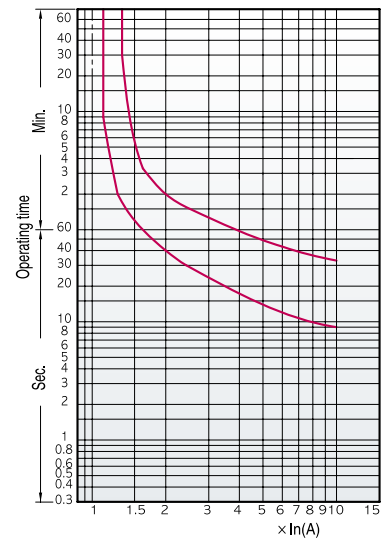


**GTK-220/L**

**GTK-400/L**

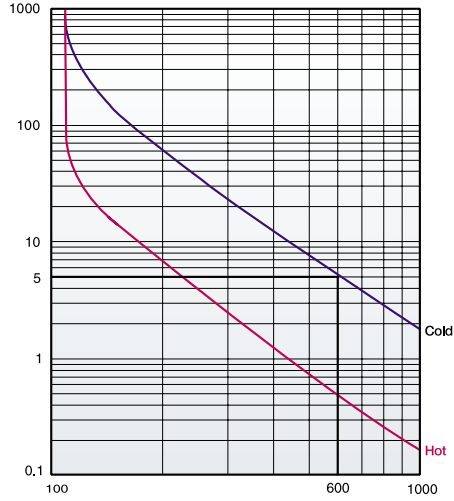


**GTK-600/L**

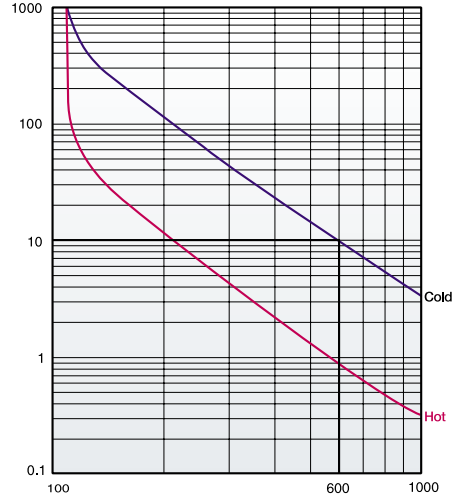


GMP

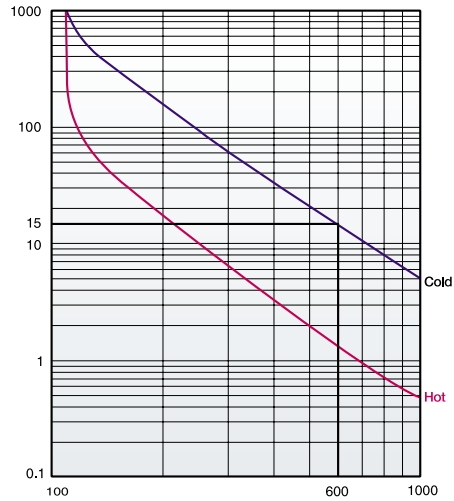
**Trip class 5**



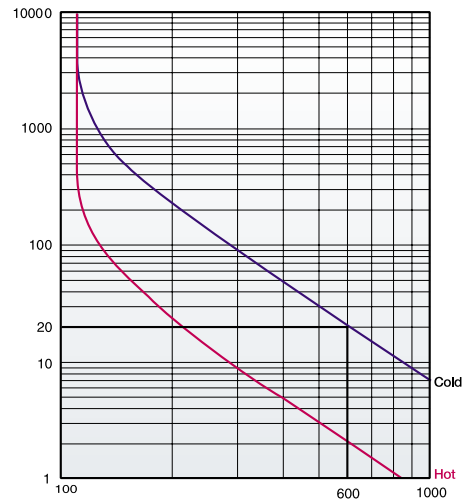
**Trip class 10**



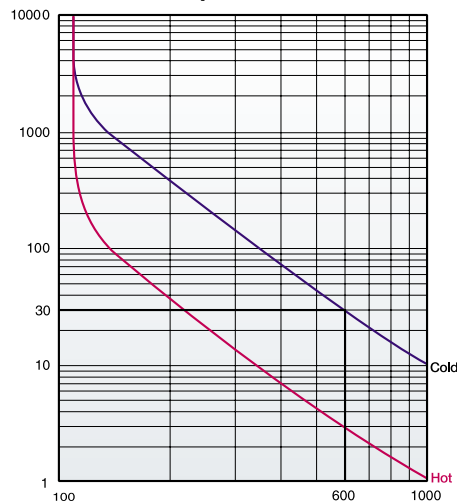
**Trip class 15**



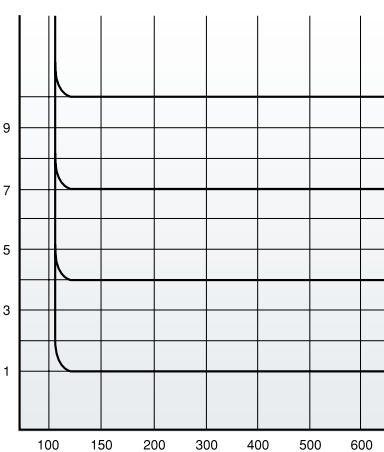
**Trip class 20**



**Trip class 30**



**Definite time curve**

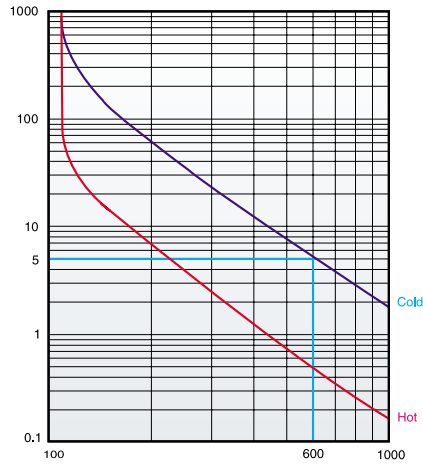


# Technical information

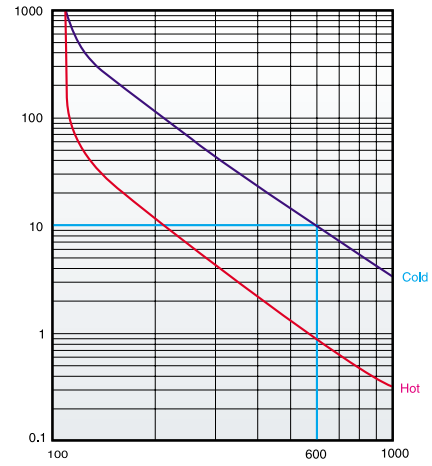
## Trip curves for digital motor protection relays

DMP

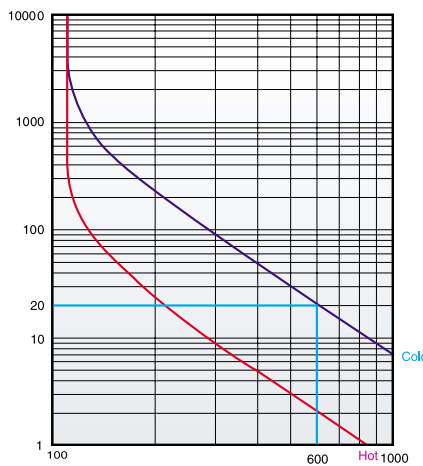
**Trip class 5**



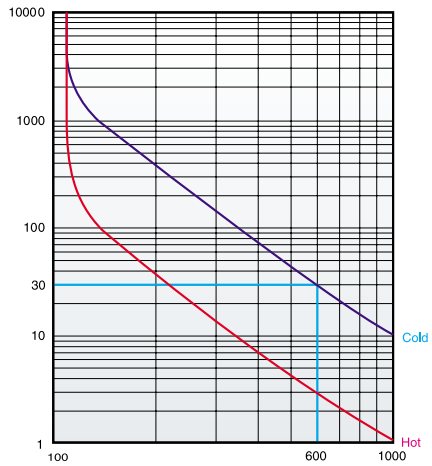
**Trip class 10**



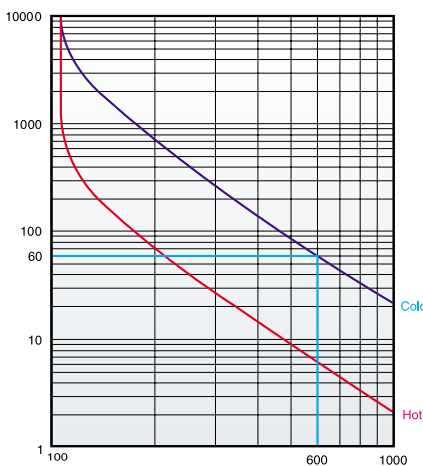
**Trip class 20**



**Trip class 30**



**Trip class 60**



**Definite time characteristics**

