



MAGNETIC CONTACTORS & OVERLOAD RELAYS

**PT. KORTECH ANUGERAH
INDONESIA**

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MAGNETIC CONTACTORS & OVERLOAD RELAYS

R&D capability is proportional to corporate competitiveness as well as self-confidence. We are moving forward in power solution of low voltage field with our unique technology. DAERYUK provide reliable products for stable power supply and control based on cutting-edge technology.



MC150



MC180
(MC180~220)



MC18
(MC9~MC22)

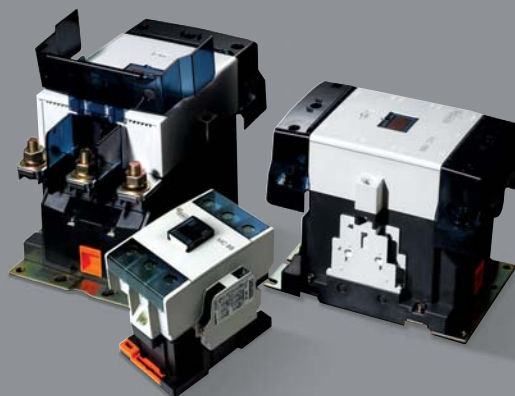


MC40
(MC32~48)



MC50
(MC50~85)

Magnetic Contactor & Overload Relays



△ UL CE KC ISO9001 ISO14001



MC300
(MC300~400)



MC100
(MC100~125)

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Magnetic Contactors & Overload Relays



MC 9 ~ 85 Low Ampere

Eco friendly & Reliable



Enhanced safety by adopting Transparent Safety Cover.

- The transparent safety cover helps improve life and function by preventing foreign substances(dust, etc.) and wrong operation by user.



Convenient and Safe structure.

- Transparent terminal cover enables to detect wrong wiring and discolor by overheating.
- When wiring, users can open the terminal covers easily and work safely.
- Various installation available with the use of 35mm DIN-rail.



Improved Quality and Decreased Noise

- Extended life is achieved by new technology of contact
- Suitable for severe duty operation such as inch driving and phase reverse by improving arc resistance, abrasion resistance, electrical life expectancy, etc.



International standard

- Compliant to IEC 60947 standard.



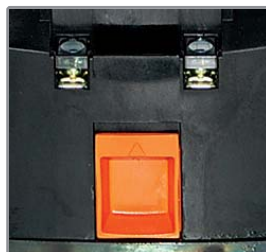
MC 100 ~400A High Ampere

Convenient



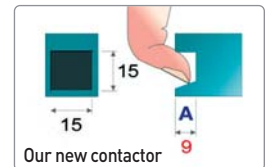
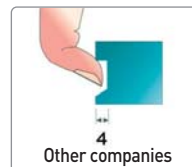
Fold-out type terminal cover for user`s safety

- Transparent terminal cover is applied with Hinge type in top cover body to prevent loss of cover. Also, Finger-proof function by the constantly-attached terminal cover is designed to secure the best safety. When wiring, users can open the terminal covers easily and work conveniently and safely.



Convenient and Ergonomic design for user

- Changing of coil ass'y is easy by the ergonomic design of 'A' in Coil Ass'y Locker.



Improved Quality and Decreased Noise

- By using Cassette type coil unit, users can replace and separate coil alone with contactor installed.
- Reliability improved by using special coil for each voltage.

Thermal Relays & Accessories

Space secured for easy wiring

Transparent Terminal Cover
(Wrong Wiring and Color changed by heat can be seen.)

Adjustment Dial (3-level change of ampere)

TEST/TRIP function

Automatic Reset function

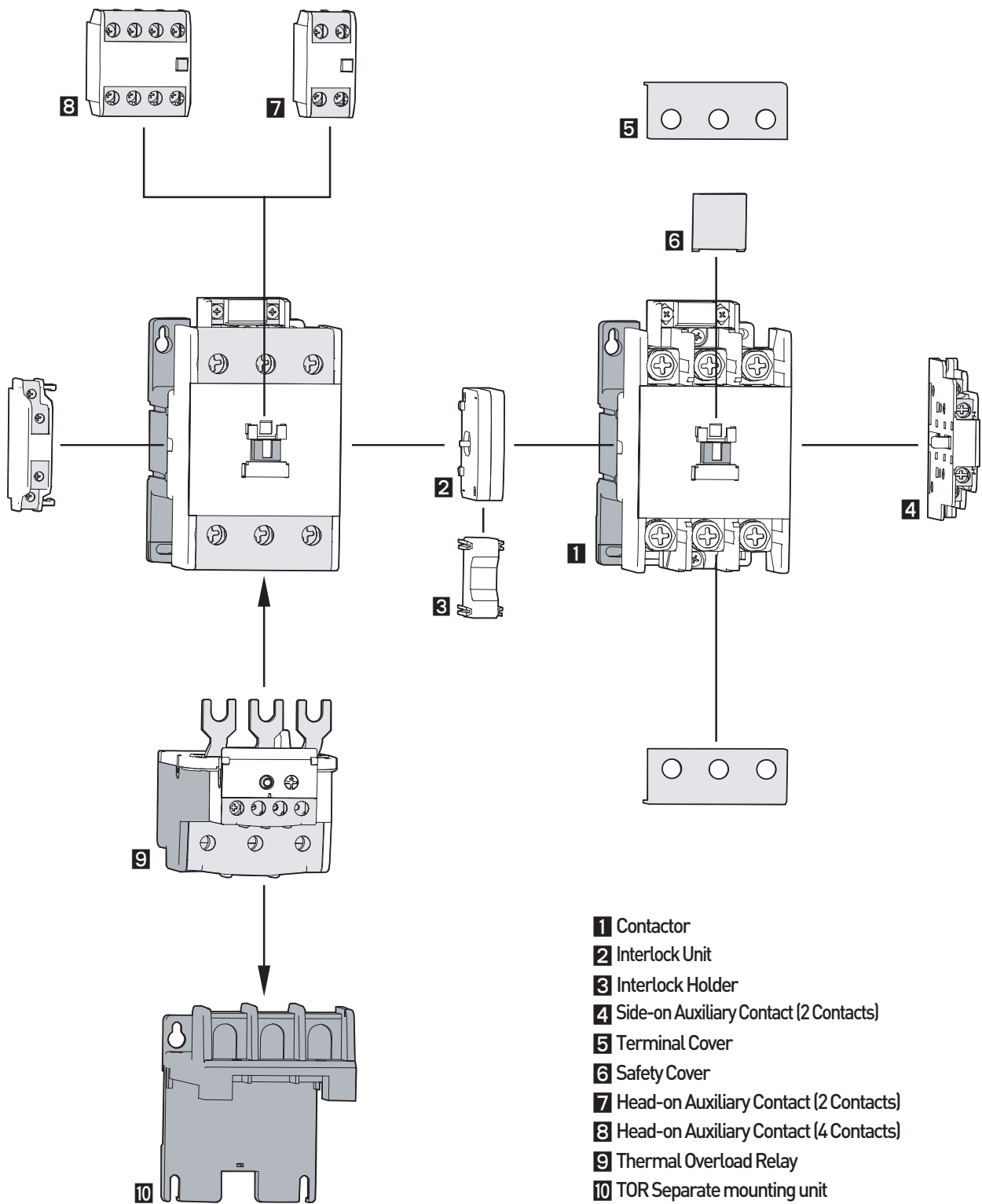
Separation of power part and operation part

- Settings protected by cover
- Small Space

Direct connection to MC

- Separate connection terminal is unnecessary.





Ordering Information

Magnetic Switches (Contactors)

M	C	22	/	R	AC220V
Magnetic Contactor	Type	Rated Current [AC 440V]		Application	Coil Voltage
	C Contactor(AC Coil)	9	7A	75	75A
	D Contactor(DC Coil)	12	9A	85	80A
	S Switch(AC Coil)	18	13A	100	100A
	SD Switch(DC Coil)	22	20A	125	120A
		32	25A	150	150A
		40	32A	180	180A
		48	35A	220	220A
		50	48A	300	300A
		65	65A	400	400A
				- Standard	AC 24~600V
				R Reversing	DC 12~250V
				H Hoist	

※ Refer to the Coil Rating on Page 22, 23.

※ Refer to the Coil Rating on Page 22, 23.

Thermal Overload Relays

T	H	22	H	/	3	/	5A
Thermal Overload Relay	Ampere Frame		Installation type		Rated Current		
	22	0.1~22A	-	Standard	0.14	0.1~0.16	34
	40	4~40A	H	Separate mounting	0.21	0.16~0.25	42
	85	7~85A			0.33	0.25~0.4	55
	100	34~125A			0.52	0.4~0.63	65
	150	34~150A			0.82	0.63~1	74
	220	65~240A			1.3	1~1.6	41
	400	85~400A			2.1	1.6~2.5	48
Type			Elements		3.3	2.5~4	56
H Standard			- 2 elements		5	4~6	67
K Phase Loss Protection			3 3 elements		6.5	5~8	80
					7.5	6~9	107
					8.5	7~10	130
					11	9~13	150
					15	12~18	200
					19	16~22	250
					22	18~26	350
					30	24~36	

Control Relays

MR	—	4	D	AC220V																				
Control Relay		<table><tr><th>Type</th><th>No. of Contacts</th></tr><tr><td>4</td><td>4 Contacts</td></tr><tr><td>6</td><td>6 Contacts</td></tr><tr><td>8</td><td>8 Contacts</td></tr></table>	Type	No. of Contacts	4	4 Contacts	6	6 Contacts	8	8 Contacts	<table><tr><th>Type of operation</th><th></th></tr><tr><td>—</td><td>AC Coil</td></tr><tr><td>D</td><td>DC Coil</td></tr></table>	Type of operation		—	AC Coil	D	DC Coil	<table><tr><th>Coil Voltage</th><th></th></tr><tr><td>AC</td><td>24~600V</td></tr><tr><td>DC</td><td>12~250V</td></tr></table>	Coil Voltage		AC	24~600V	DC	12~250V
Type	No. of Contacts																							
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8	8 Contacts																							
Type of operation																								
—	AC Coil																							
D	DC Coil																							
Coil Voltage																								
AC	24~600V																							
DC	12~250V																							
			※ Refer to the Coil Rating on Page 47.																					

Auxiliary Units

AU

Auxiliary unit

100

Type	No. of Contacts	Mounting Position	Applied MC
1	2 Contacts	Side	MC 9~85
2	2 Contacts	Head	
4	4 Contacts		
100	2 Contacts	Side	MC 100~400

Mechanical Interlock Units

DR	—	100								
Interlock unit		<table><tr><th>Type</th><th>Applied MC</th></tr><tr><td>9</td><td>MC 9~85</td></tr><tr><td>100</td><td>MC 100~150</td></tr><tr><td>180</td><td>MC 180~400</td></tr></table>	Type	Applied MC	9	MC 9~85	100	MC 100~150	180	MC 180~400
Type	Applied MC									
9	MC 9~85									
100	MC 100~150									
180	MC 180~400									

Note 1. Definite Purpose Contactor see page 21.
2. Electronic Over Current Relay see page 40.

List of Standard Products



Type				MC 9	MC 12	MC 18	MC 22	MC 32	MC 40	MC 48	MC 50	
IEC 60947	3 phase squirrel cage motor	AC3	200~240V	2,5kW 11A	3,5kW 13A	4,5kW 18A	5,5kW 20A	7,5kW 32A	11kW 40A	11kW 48A	15kW 50A	
			380~440V	4kW 9A	5,5kW 12A	7,5kW 18A	11kW 20A	15kW 26A	18,5kW 35A	18,5kW 35A	22kW 48A	
			500~550V	4kW 7A	7,5kW 12A	7,5kW 13A	15kW 22A	18,5kW 28A	22kW 32A	22kW 40A	30kW 43A	
			690V	4kW 5A	7,5kW 9A	7,5kW 9A	15kW 18A	18,5kW 20A	22kW 23A	22kW 25A	30kW 28A	
		AC4	200~240V	1,5kW 8A	2,2kW 11A	3,7kW 18A	3,7kW 18A	4,5kW 20A	5,5kW 25A	7,5kW 30A	7,5kW 35A	
			380~440V	2,2kW 6A	4kW 6A	4kW 9A	5,5kW 13A	7,5kW 17A	11kW 24A	11kW 28A	15kW 32A	
Ith AC1				25A	25A	40A	40A	50A	60A	70A	80A	
Endurance (x 10,000 times)		Electrical		250	250	250	250	200	200	200	200	
		Mechanical		2500	2500	2500	2500	1500	1500	1500	1000	
Aux. Contact (Standard)				1a1b	1a1b	1a1b	1a1b	2a2b	2a2b	2a2b	2a2b	
Aux. Contact		Side-on		Screw and DIN Rail								
		Head-on		AU 1	AU 1	AU 1	AU 1	AU 1	AU 1	AU 1	AU 1	
Mounting method				AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	
Dimension(mm) (W×H×D)				44×78×86,8	44×78×86,8	44×78×86,8	44×78×86,8	66×82,6×94,6	66×82,6×94,6	66×82,6×94,6	92×122×117,3	
Mounting Dimension (mm)		(W×D)		30~35×48~59 35×60	30~35×48~59 35×60	30~35×48~59 35×60	30~35×48~59 35×60	30~35×48~59 35×60	30~35×48~59 35×60	30~35×48~59 35×60	100×50~60 100×60	
Application	Contactor	With DC-operated Coil		MD 9	MD 12	MD 18	MD 22	MD 32	MD 40	MD 48	—	
		Reversing		MC 9R	MC 12R	MC 18R	MC 22R	MC 32R	MC 40R	MC 48R	MC 50R	
	Switch	Standard		MS 9	MS 12	MS 18	MS 22	MS 32	MS 40	MS 48	MS 50	
		Reversing		MS 9R	MS 12R	MS 18R	MS 22R	MS 32R	MS 40R	MS 48R	MS 50R	
		Phase Loss protection		MS 9K	MS 12K	MS 18K	MS 22K	MS 32K	MS 40K	MS 48K	MS 50K	
Thermal Overload Relay		Standard		TH 22	TH 22	TH 22	TH 22	TH 40	TH 40	TH 40	TH 85	
		3 elements		TH 22/3	TH 22/3	TH 22/3	TH 22/3	TH 40/3	TH 40/3	TH 40/3	TH 85/3	
		Separate mounting		TH 22H	TH 22H	TH 22H	TH 22H	TH 40H	TH 40H	TH 40H	TH 85H	
		Phase Loss protection		TK 22	TK 22	TK 22	TK 22	TK 40	TK 40	TK 40	TK 85	
IEC 60947-1				●	●	●	●	●	●	●		
Certification		KSC IEC 60947-4-1		●	●	●	●	●	●	●	●	
		UL 508		●	●	●	●	—	—	—	—	
		CE, TUV		●	●	●	●	●	●	●	●	



	MC 65	MC 75	MC 85	MC 100	MC 125	MC 150	MC 180	MC 220	MC 300	MC 400
	18,5kW 65A	22kW 75A	25kW 80A	30kW 100A	37kW 125A	45kW 150A	55kW 180A	75kW 220A	90kW 300A	125kW 400A
	30kW 65A	37kW 75A	45kW 80A	55kW 100A	60kW 125A	75kW 150A	90kW 180A	132kW 220A	160kW 300A	200kW 400A
	33kW 60A	37kW 64A	45kW 75A	55kW 85A	60kW 90A	90kW 140A	110kW 180A	132kW 200A	160kW 250A	225kW 350A
	33kW 35A	37kW 42A	45kW 45A	55kW 65A	60kW 70A	90kW 100A	110kW 120A	132kW 150A	200kW 220A	250kW 300A
	11kW 50A	13kW 55A	15kW 65A	19kW 80A	22kW 93A	30kW 125A	37kW 150A	45kW 180A	55kW 220A	75kW 300A
	22kW 47A	25kW 52A	30kW 62A	37kW 75A	45kW 90A	55kW 110A	75kW 150A	90kW 180A	110kW 220A	150kW 300A
	100A	110A	135A	160A	160A	210A	230A	275A	350A	450A
	200	200	200	100	100	100	100	100	100	50
	1000	1000	1000	500	500	500	500	500	500	500
	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b	2a2b
	Screw and DIN Rail			Screw only						
	AU 1	AU 1	AU 1	AU 100	AU 100	AU 100	AU 100	AU 100	AU 100	AU 100
	AU 2, AU 4	AU 2, AU 4	AU 2, AU 4	–	–	–	–	–	–	–
	92×122×117,3	92×122×117,3	92×122×117,3	100×157,4×146,5	100×157,4×146,5	120×166,8×157	138×203×181	138×203×181	163×243×198	163×243×198
	100×50~60 100×60	100×50~60 100×60	100×50~60 100×60	80 ×100 90 ×125	80 ×100 90 ×125	100 ×125~130	45 ×190 120 ×190	45 ×190 120 ×190	50×210 60×220 145 ×225	50×210 60×220 145 ×225
	–	–	–	–	–	–	–	–	–	–
	MC 65R	MC 75R	MC 85R	MC 100R	MC 125R	MC 150R	MC 180R	MC 220R	MC 300R	MC 400R
	MS 65	MS 75	MS 85	MS 100	MS 125	MS 150	MS 180	MS 220	MS 300	MS 400
	MS 65R	MS 75R	MS 85R	MS 100R	MS 125R	MS 150R	MS 180R	MS 220R	MS 300R	MS 400R
	MS 65K	MS 75K	MS 85K	MS 100K	MS 125K	MS 150K	MS 180K	MS 220K	MS 300K	MS 400K
	TH 85	TH 85	TH 85	TH 100	TH 100	TH 150	TH 220	TH 220	TH 400	TH 400
	TH 85/3	TH 85/3	TH 85/3	TH 100/3	TH 100/3	TH 150/3	TH 220/3	TH 220/3	TH 400/3	TH 400/3
	TH 85H	TH 85H	TH 85H	–	–	–	–	–	–	–
	TK 85	TK 85	TK 85	TK 100	TK 100	TK 150	TK 220	TK 220	TK 400	TK 400
	●	●	●	●	●	●	●	●	●	●
	●	●	●	●	●	●	●	●	●	–
	–	–	–	–	–	–	–	–	–	–
	●	●	●	●	●	●	●	●	●	●

Standard AC Magnetic Contactors/Switches

According
to IEC
60947

Type		Rating																Rated Thermal Current Ith (AC1)
Magnetic Contactor	Magnetic Switch	3 phase squirrel cage motor (AC3)						3 phase wound rotor motor (AC2B)						3 phase squirrel cage motor inching, plugging (AC4)				
		200~240V		380~440V		500~550V		200~240V		380~440V		500~550V		200~240V		380~440V		
		kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	kW	A	
MC 9	MS 9	2,5	11	4	9	4	7	4	5	4	9	4	7	1,5	8	2,2	6	25
MC 12	MS 12	3,5	13	5,5	12	7,5	12	7,5	9	5,5	12	7,5	12	2,2	11	4	9	25
MC 18	MS 18	4,5	18	7,5	18	7,5	13	7,5	9	7,5	18	7,5	13	3,7	18	4	9	40
MC 22	MS 22	5,5	20	11	20	15	22	15	18	11	22	15	22	3,7	18	5,5	13	40
MC 32	MS 32	7,5	32	15	26	18,5	28	18,5	21	15	32	18,5	28	4,5	20	7,5	17	50
MC 40	MS 40	11	40	18,5	35	22	32	22	25	18,5	40	22	32	5,5	25	11	24	60
MC 48	MS 48	11	48	18,5	35	22	40	22	25	18,5	40	22	32	7,5	30	11	28	60
MC 50	MS 50	15	50	22	48	30	43	30	33	22	50	30	43	7,5	35	15	32	80
MC 65	MS 65	18,5	65	30	65	33	60	37	42	30	65	37	60	11	50	22	47	100
MC 75	MS 75	22	75	37	75	37	64	45	47	37	75	45	64	13	55	25	52	110
MC 85	MS 85	25	80	45	80	45	75	45	52	45	85	45	75	15	65	30	62	135
MC 100	MS 100	30	100	55	100	55	85	19	80	37	80	37	80	19	80	37	75	160
MC 125	MS 125	37	125	60	125	60	90	22	93	45	90	55	90	22	93	45	90	160
MC 150	MS 150	45	150	75	150	90	140	30	125	55	110	55	90	30	125	55	110	210
MC 180	MS 180	55	180	90	180	110	180	37	150	75	120	75	120	37	150	75	150	230
MC 220	MS 220	75	220	132	250	132	200	45	180	90	180	110	180	45	180	90	180	275
MC 300	MS 300	90	300	160	300	160	250	55	220	110	220	132	200	55	220	110	220	350
MC 400	MS 400	125	400	200	400	225	350	75	300	150	265	150	230	75	300	150	300	450
MC 600	MS 600	190	630	330	630	330	500	110	400	200	400	225	360	110	400	200	400	660
MC 800	MS 800	220	800	440	800	500	720	160	600	300	600	375	600	160	630	300	630	900

Note. Finger-proof covers of Magnetic Contactors and Thermal Overload Relays are optional (Protection Level: IP 20)

Auxiliary
Contact
Ratings

Type	Rated Operation Current (A)																Rated Thermal Current Ith (AC1)
	AC15(11)[Inductive Load on AC]				DC13(11)[Inductive Load on DC]				AC12(13)[Resistive Load on AC]				DC12(14)[Resistive Load on DC]				
	110V	220V	440V	550V	24V	48V	110V	220V	110V	220V	440V	550V	24V	48V	110V	220V	A
MC(D)9~22	6	3	1.5	1.2	3	1.5	1.1	0.55	10	8	5	5	5	3	2.5	1	16
MC(D)32~85	6	3	1.5	1.2	3	1.5	1.1	0.55	10	8	5	5	5	3	2.5	1	16
MC 100~400	6	5	1.5	1.2	3	1.5	1.1	0.55	10	10	5	5	5	3	2.5	1	16

Note 1. Numbers in parentheses are designations by class before the change in KS.

2. DC low current rating of AU 1, 2, 4, 100 is DC24V 10mA.

3. DC low current rating of AU 100 is DC7V 5mA.

Contact
Arrangement

Type	Standard Contacts	Option
MC(D)9~22	1a1b	4a, 3a1b, 2a2b, 1a3b
MC(D)32~48	2a2b	4a, 3a1b, 2a2b, 1a3b
MC50~85	2a2b	4a, 3a1b, 2a2b, 1a3b
MC100~400	2a2b	2a2b

Note 1. Options are for the case that auxiliary units are attached.



AC Operation

■ MC 9~85

Designation	Voltage Range
AC24V	24V 50Hz / 24V 60Hz
AC48V	48V 50Hz / 48V 60Hz
AC110V	100V 50Hz / 100~110V 60Hz
AC120V	110~120V 50Hz / 115~120V 60Hz
AC220V	200V 50Hz / 200~220V 60Hz
AC240V	220~240V 50Hz / 230~240V 60Hz
AC380V	346~360V 50Hz / 380V 60Hz
AC440V	380~400V 50Hz / 400~440V 60Hz
AC480V	415~440V 50Hz / 460~480V 60Hz

■ MC 100~400

Designation	Voltage Range
AC110V	100~127 V 50Hz/60Hz
AC220V	200~240V 50Hz/60Hz
AC380V	380~440V 50Hz/60Hz

Note 1. Designation is the symbol for ordering.

Please make sure to check the voltage range by designation.



DC Operation

■ MD 9~48

Designation	Voltage Range
DC	12V, 24V, 48V, 60V, 110V, 125V, 200V, 220V, 250V

Operating Limits

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

Characteristics of AC Coil

■ AC 220V, 60Hz

Type	Electromagnet Capacity[VA]		Thermal Dissipation[W]	Operating Voltage		Coil Current [mA]	Operating Time[ms]	
	Inrush	Holding		Pick-up	Drop-out		CoilON → Main ContactON	CoilON → Main ContactOFF
MC 9, 12, 18, 22	95	9	2	141~156	105~125	41	10~17	6~9
MC 32, 40, 48	95	9	2	150~165	110~130	41	11~19	6~10
MC 50, 65, 75, 85	220	17	5	145~160	100~120	77	16~25	8~15
MC 100, 125	298	12.3	4.4	77	48	56	55	55
MC 150	298	12.3	4.4	77	48	56	55	55
MC 180, 220	380	11.6	4.7	77	48	53	70	70
MC 300, 400	571	14	5	77	48	64	55	55

Note. Above data are average values.

■ AC 110V, 60Hz

Type	Electromagnet Capacity[VA]		Thermal Dissipation[W]	Operating Voltage		Coil Current [mA]	Operating Time[ms]	
	Inrush	Holding		Pick-up	Drop-out		CoilON → Main ContactON	CoilON → Main ContactOFF
MC 9, 12, 18, 22	95	8	2	75~85	55~65	73	11~18	6~9
MC 32, 40, 48	95	8	2	75~85	55~65	73	13~20	6~9
MC 50, 65, 75, 85	220	17	5.5	68~78	40~50	154	16~25	9~16
MC 100, 125	162	9.8	3.1	77	48	89	60	60
MC 150	162	12.2	3	77	48	111	60	60
MC 180, 220	220	9.1	3.4	77	48	83	70	70
MC 300, 400	393	14	4.4	77	48	128	60	60

Note. Above data are average values.

Characteristics of DC Coil

■ DC 110V

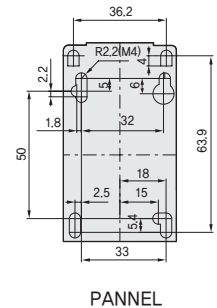
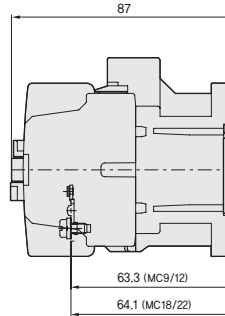
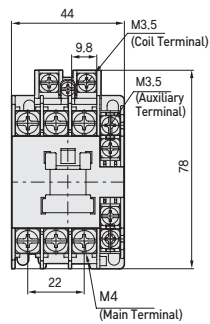
Type	Electromagnet Capacity[VA]		Thermal Contact [ms]	Operating Voltage		Coil Current [mA]	Operating Time[ms]	
	Inrush	Holding		Pick-up	Drop-out		CoilON → Main ContactON	CoilON → Main ContactOFF
MD 9, 12, 18, 22	9	9	50	60~75	15~35	90	45~55	8~15
MD 32, 40, 48	9	9	50	60~75	15~35	90	45~55	8~15

Note. 1. Above data are average values.
2. No polar classification of coil terminal.

Standard AC Magnetic Contactors/Switches

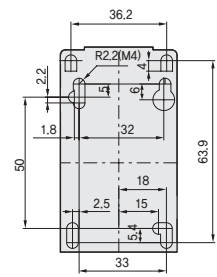
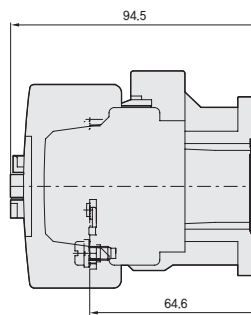
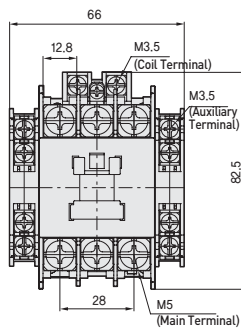
External Dimensions and Contact Configurations (Standard AC Magnetic Contactors)

MC 9
MC 12
MC 18
MC 22



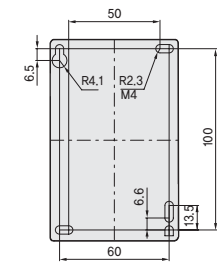
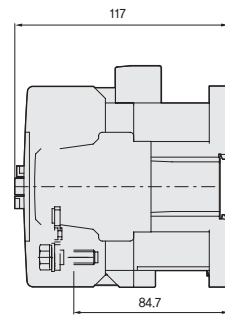
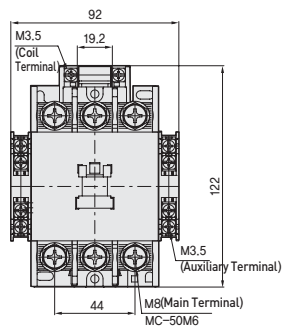
PANNEL

MC 32
MC 40
MC 48



PANNEL

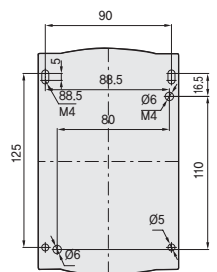
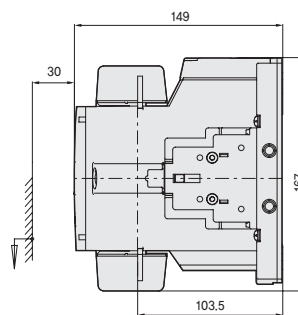
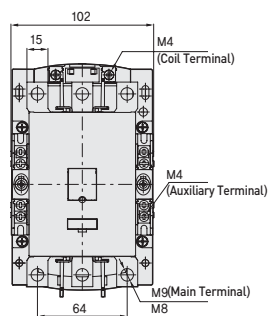
MC 50
MC 65
MC 75
MC 85



PANNEL

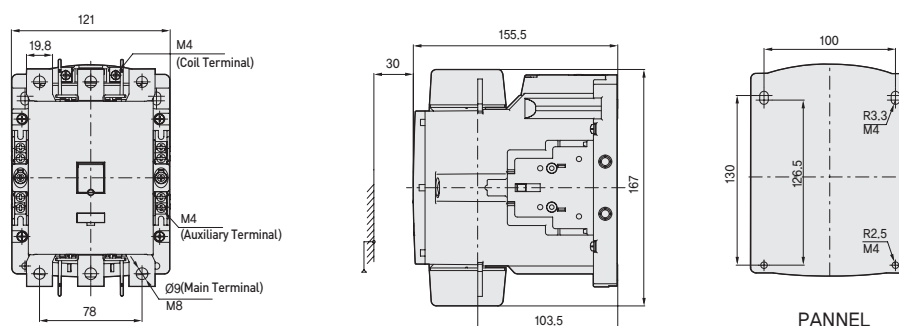
MC 100
MC 125

Note2

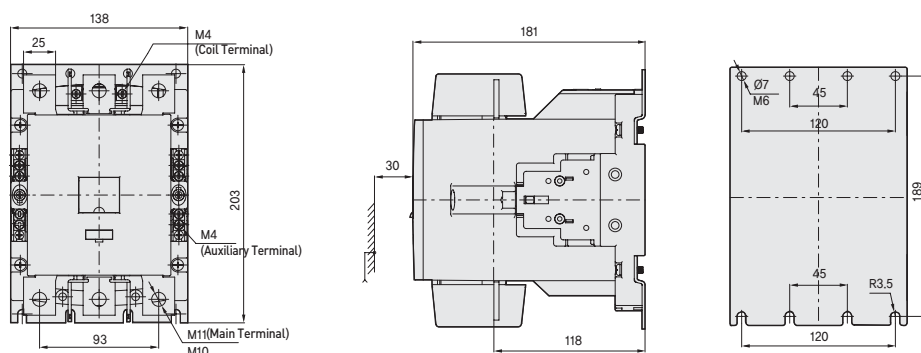


PANNEL

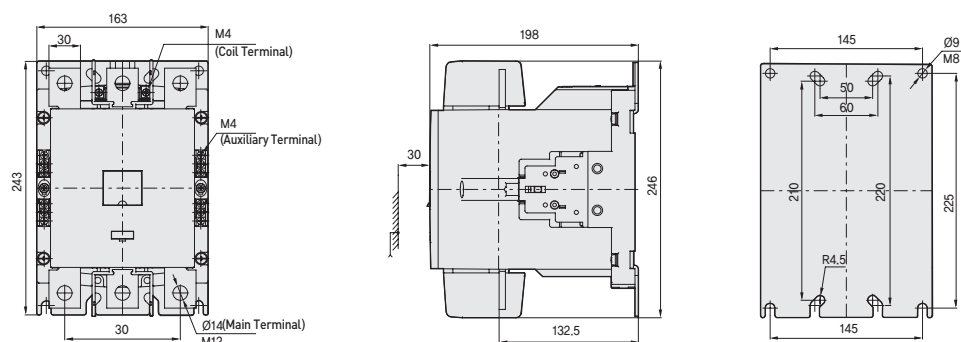
MC 150



MC 180 MC 220

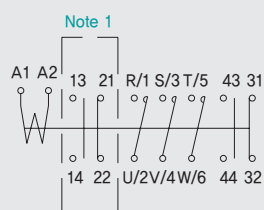


MC 300 MC 400

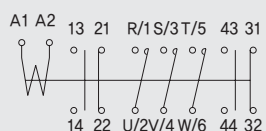


Contact Configurations

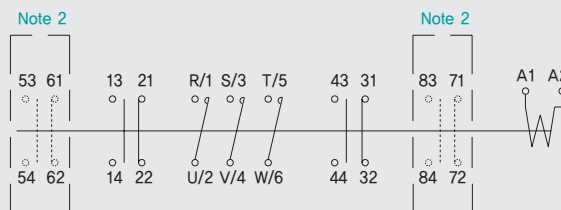
MC 9~22



MC 32~85



MC 100~800

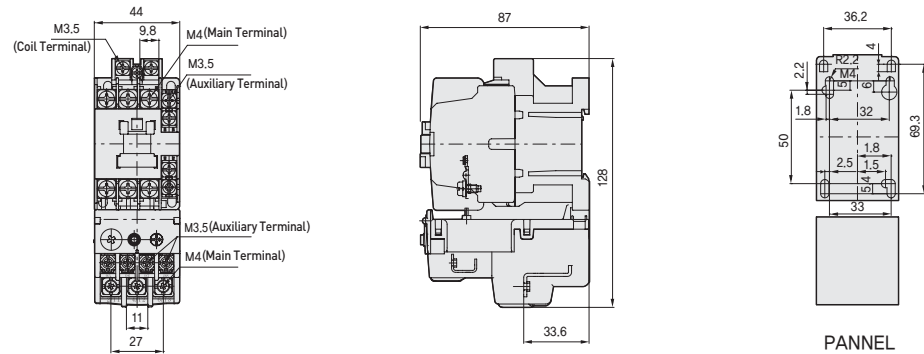


Note 1. Aux. Contact: 2a2b
2. Aux. Contact: 4a4b

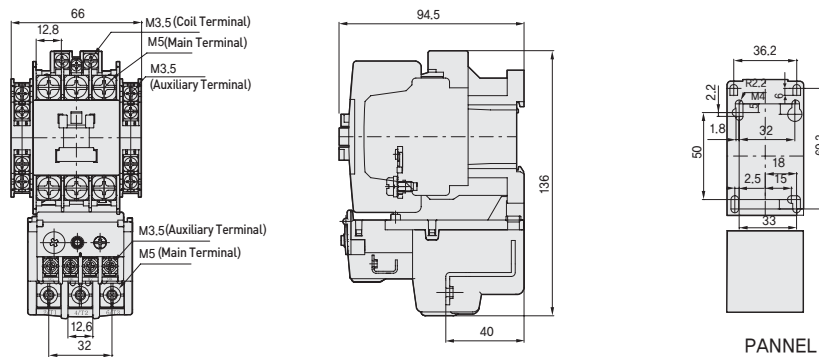
Standard AC Magnetic Contactors/Switches

External Dimensions and Contact Configurations (Standard AC Magnetic Contactors)

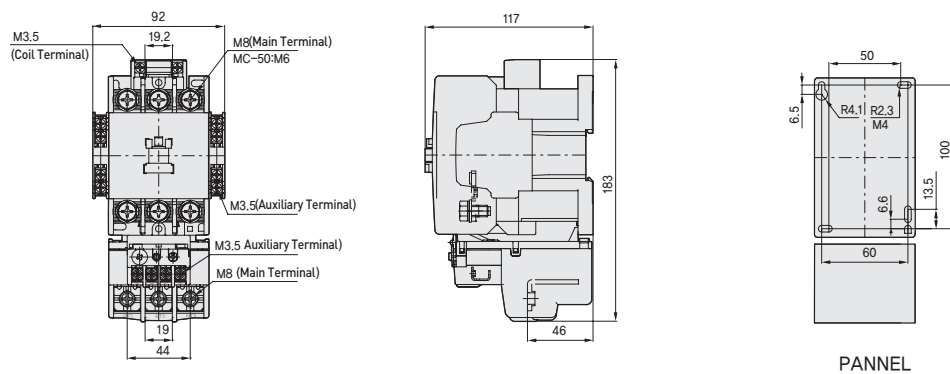
MS 9
MS 12
MS 18
MS 22



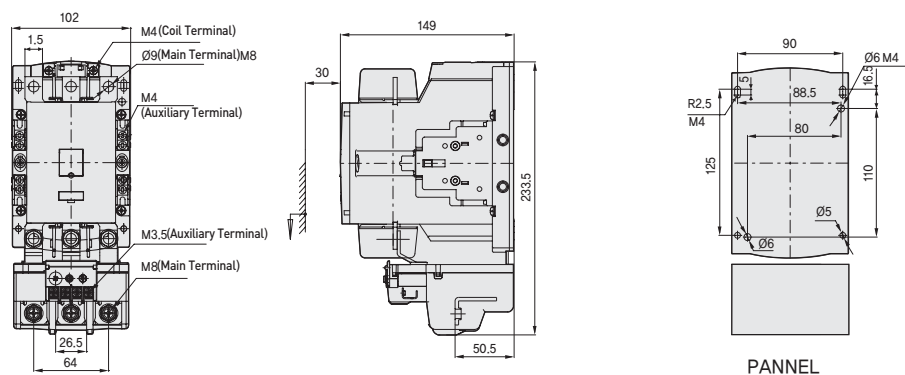
MS 32
MS 40



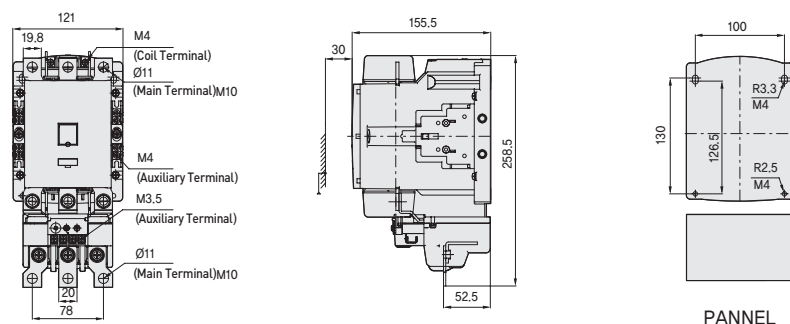
MS 50
MS 65
MS 75
MS 85



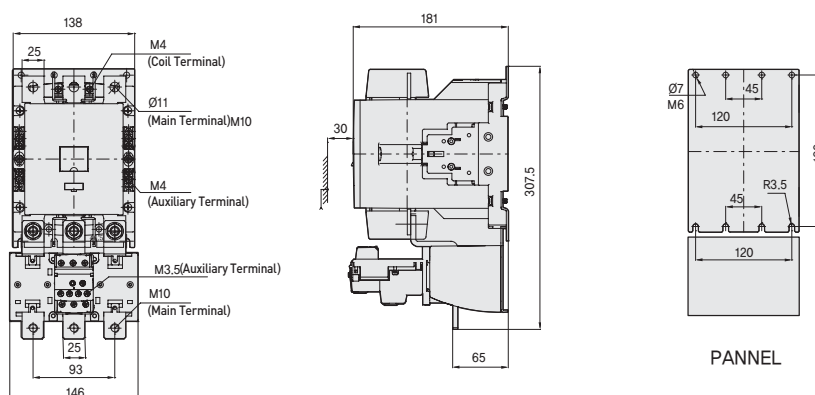
MS 100
MS 125



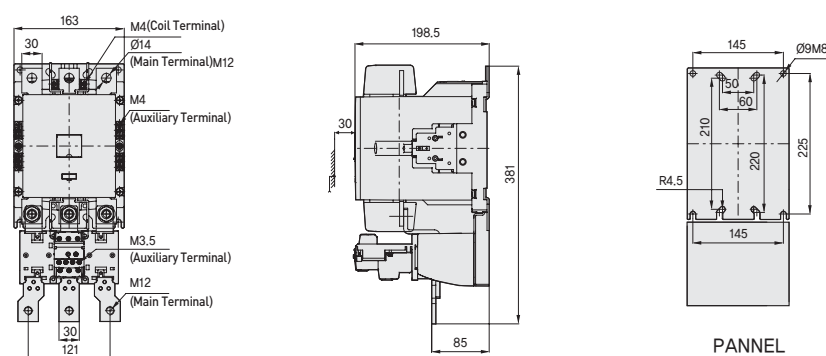
MS 150



MS 180 MS 220

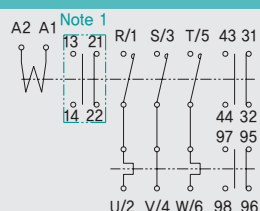


MS 300 MS 400



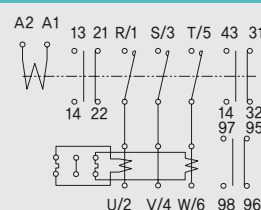
Contact Configurations

MS 9~150



Note 1. Aux. Contact: 2a2b

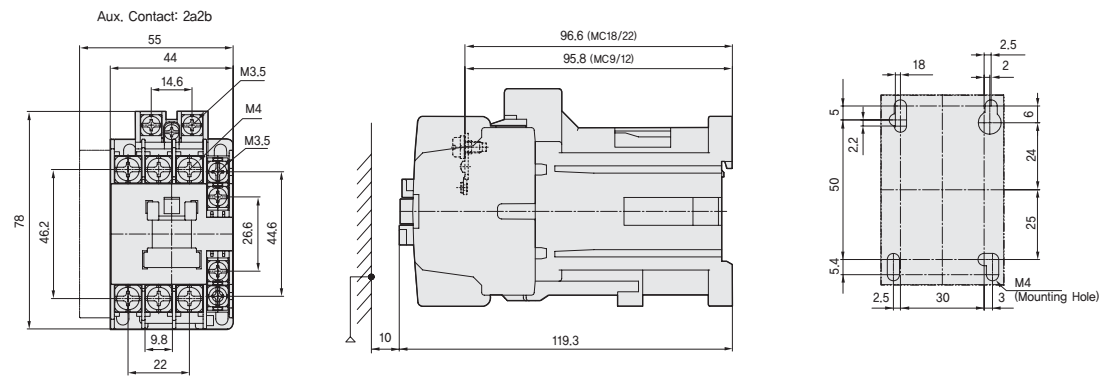
MS 180~400



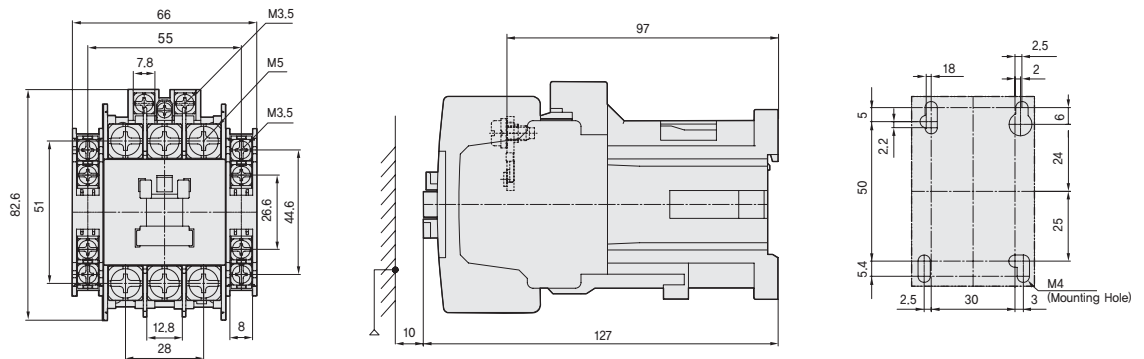
Standard AC Magnetic Contactors/Switches

External Dimensions and Contact Configurations (DC-operated AC Magnetic Contactors)

MD 9
MD 12
MD 18
MD 22

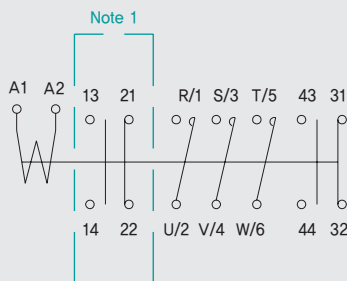


MD 32
MD 40
MD 48

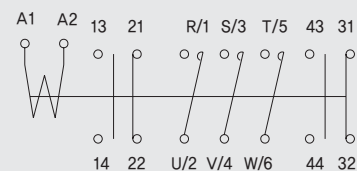


■ Contact Configurations

MD 9~22



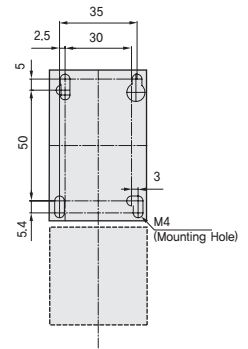
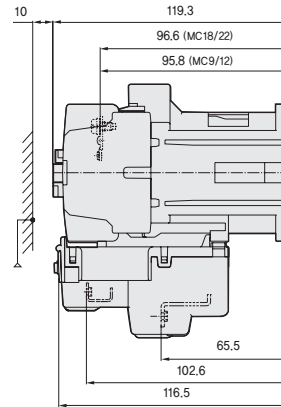
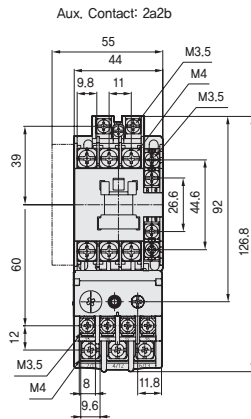
MD 32~48



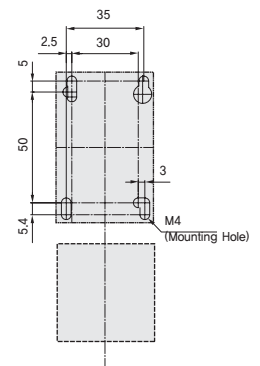
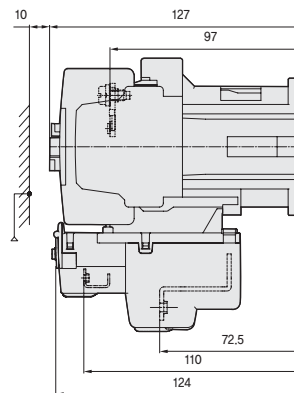
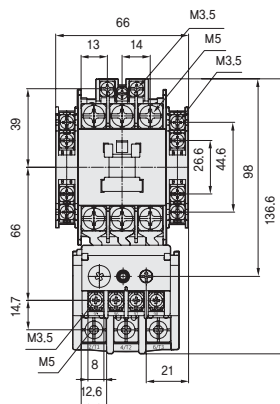
Note 1. Aux. Contact: 2a2b

External Dimensions and Contact Configurations (DC-operated AC Magnetic Switches)

MSD 9
MSD 12
MSD 18
MSD 22

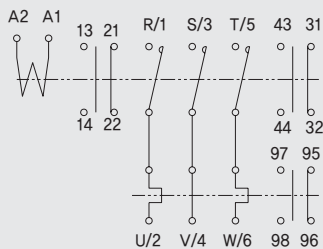


MSD 32
MSD 40
MSD 48



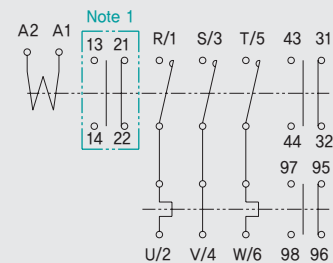
■ Contact Configurations

MSD 9~22



Note 1. Aux. Contact: 2a2b

MSD 32~48



Definite Purpose Contactor

Definite Purpose Contactor is a small and light weight magnetic contactor which can be widely used for motor control such as air conditioner, electric water heater, refrigerator, dryer, heater, showcase, industrial cleaner, pump, compressor, etc. and switching on/off heater and lighting equipment.

- Minimizing installation space by Small size and Light weight
- Expanding application by various types in a same frame
- Protection from dust and arc attaching transparent cover on the crossbar part of top side.
- Terminal Cover can be attached on the connecting terminal parts for safety.
- Discolored terminal and wrong wiring can be easily identified through a transparent safety cover.
- Streamlined shape gives Eco-friendly impression and easily distinguished color on panel board.
- Diverse mounting methods are available with DIN-Rail(Standard) type and Clamp type in case of single phase contactor.
- Definite Purpose Contactor series are fulfilled by releasing Three- phase contactor
- Aux contact can be add on Single phase contactor.

※ 1a or 1b is available on DIN-rail type.

Note) Aux. contact can be ordered following the ordering method.



Rating and Performance DIN-Rail type(standard)

Model				MC-10P2	MC-20P2	MC-25P2	MC-30P2	MC-35P2	MC-40P2
No. of poles				2	2	2	2	2	2
Contact Configuration				2a	2a	2a	2a	2a	2a
Rated Insulation voltage(V)			AC	690					
			DC	250					
Rating	AC 3	Rated Current (A)	200~220V	10	20	25	30	35	40
			380~440V	8	17	21	23	26	32
			500~550V	6	14	17	21	23	26
AC1 lth(A)				20	30	35	40	45	50
Aux. contact				1a or 1b					

Operating coil and Performance

Operational voltage	Input(VA)		Heat dissipation (W)	Operating voltage(V)		Coil current (mA)	Operating time(ms)	
	Inrush	Holding		Pick-up	Drop-out		Coil ON → Main Contact ON	Coil ON → Main Contact ON
24V 50/60Hz	35	0.6	2	18~20	10~15	263	40	30
48V 50/60Hz	35	0.6	2	36~40	19~27	131	40	30
100V 50Hz/100~110V 60Hz	35	0.6	2	78~90	50~64	57	40	30
110~120V 50Hz/115~120V 60Hz	35	0.6	2	90~100	52~66	53	40	30
200V 50Hz/200~220V 60Hz	35	0.6	2	160~175	90~120	29	40	30
220~240V 50Hz /230~240V 60Hz	35	0.6	2	168~185	110~135	26	40	30

Ordering method by type

Single phase

M	40	P2	/	a	AC220V
Magnetic Contactor (DIN-Rail)	Rating(A) 10 10A 20 20A 25 25A 30 30A 35 35A 40 40A	No. of poles P2 2Pole		Aux. contact - Standard a 1a b 1b	Operating voltage Refer to AC table DC unavailable

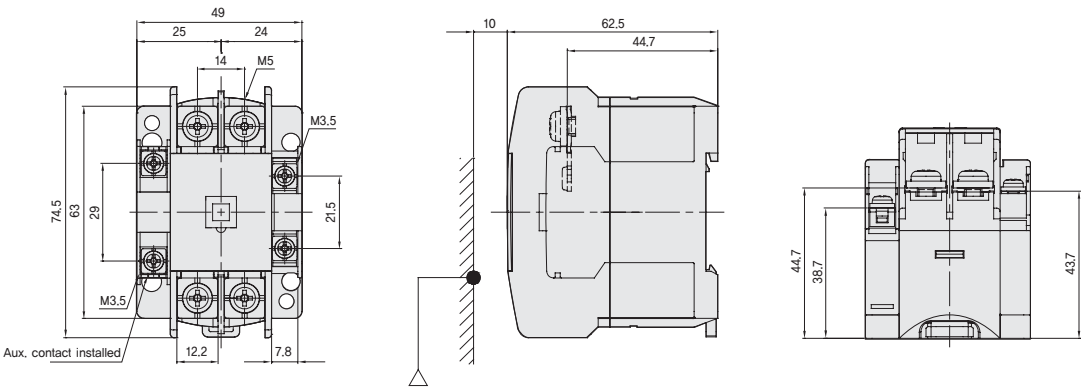
Three- phase

MC	25	a	AC220V
Magnetic Contactor	Rating(A) 20 20A 25 25A	No. of poles A 2a B 2a1b C 3a	Operating voltage Refer to AC table DC unavailable

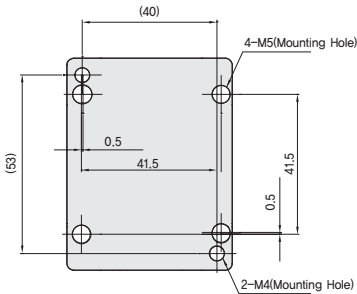
Definite Purpose Contactor

Dimension and Contact configurations (DIN-Rail type) MC-10P2~40P2

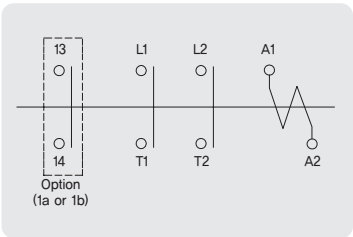
Dimension



Installation

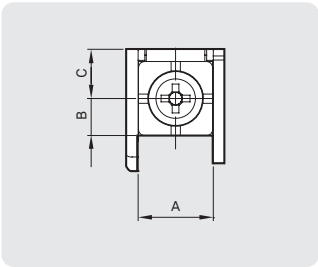


Circuit diagram

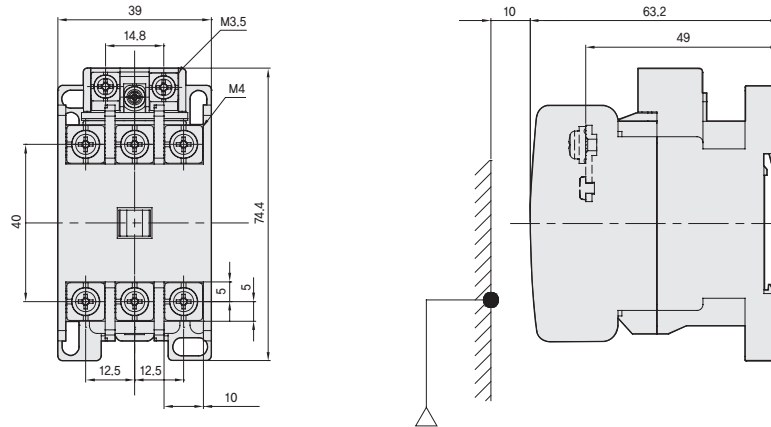


Terminal

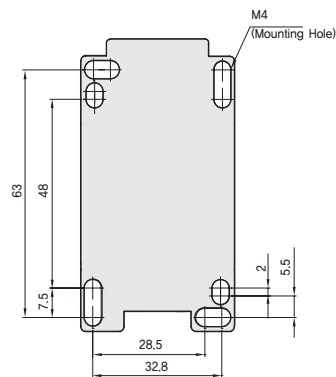
Type	Division	Screw	WIRE (mm ²)	Torque (kgg · cm)	AxBxC (mm)
MC-10P2~40P2	Main circuit	M5	1-16	26	12.2X6X8
	Coil	M3.5	1-2.5	12	8X7X4.5
	Auxiliary circuit	M3.5	1-2.5	12	8X7X4.5



Dimension

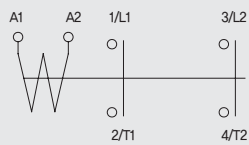


Installation

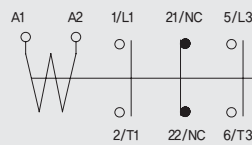


Circuit diagram

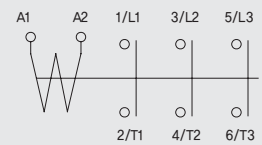
2a



2a1b

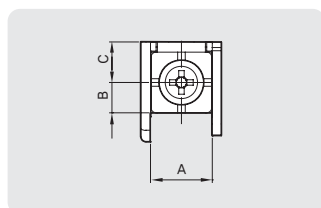


3a



Terminal

Type	Division	Screw	WIRE (mm ²)	Torque (kgg · cm)	AxBxC (mm)
MC 20~25A MC 20~25B MC 20~25C	Main circuit	M4	1~10	15	10X5X5
	Coil	M3,5	1,25~10	12	8X7X4,5



Control Relays

More Upgraded technology and performance.
Lead further in Reliability and Durability.

■ High Reliability

- Increased contact reliability by use of pure silver contact exclusively.

■ High Endurance

- Mechanical endurance is more than 10 mil. times and for electrical, it guarantees more than 0.5 to 1 mil. times according to the rated currents.

■ DIN-Rail mounting is available.

- 35mm DIN-Rail mounting is available for all types.

■ Finger proof covers as an option

- Finger proof covers are optional.



Ratings

Type		MR 4(D)		MR 6(D)		MR 8(D)		
Contact Configuration		4a,3a1b,2a2b,1a3b,4b		6a,5a1b,4a2b,3a3b,2a4b		8a,7a1b,6a2b,5a3b,4a4b		
Rated Insulation Voltage(Ui)		690V		690V		690V		
Rated Thermal Current(AC1)		16A		16A		16A		
AC	Category		AC15(11)(Inductive load)	AC12(13)(Resistive load)	AC15(11)(Inductive load)	AC12(13)(Resistive load)	AC15(11)(Inductive load)	AC12(13)(Resistive load)
	Rated Current (A)	AC110V	6	10	6	10	6	10
		AC220V	3	8	3	8	3	8
		AC440V	1.5	5	1.5	5	1.5	5
		AC550V	1.2	5	1.2	5	1.2	5
	Making, Breaking Current (A)	AC110V	66	66	66	66	66	66
		AC220V	33	33	33	33	33	33
		AC440V	16.5	16.5	16.5	16.5	16.5	16.5
AC550V		13.2	13.2	13.2	13.2	13.2	13.2	
DC	Category		DC13(11)(Inductive load)	DC12(14)(Resistive load)	DC13(11)(Inductive load)	DC12(14)(Resistive load)	DC13(11)(Inductive load)	DC12(14)(Resistive load)
	Rated Current (A)	DC24V	3	5	3	5	3	5
		DC48V	1.5	3	1.5	3	1.5	3
		DC110V	1.1	2.5	1.1	2.5	1.1	2.5
		DC220V	0.55	1	0.55	1	0.55	1
	Making, Breaking Current (A)	DC24V	3.7	–	3.7	–	3.7	–
		DC48V	1.8	–	1.8	–	1.8	–
		DC110V	1.4	–	1.4	–	1.4	–
		DC220V	0.7	–	0.7	–	0.7	–
Endurance (10,000 times)	Electrical	50	25	50	25	50	25	
	Mechanical	2,000		2,000		2,000		
Operating cycle	Cycles/hr	1,800		1,800		1,800		

Performance

Type	Pole	Cycles/hr	Mechanical endurance (10,000 times)	Electrical endurance (10,000 times)				
				AC15(11)		AC12(13)		DC13(11),12(14)
				220V	440V	220V	440V	12~220V
MR 4,4D	4	1,800	2,000	50	50	25	25	50
MR 6,6D	6	1,800	2,000	50	50	25	25	50
MR 8,8D	8	1,800	2,000	50	50	25	25	50

Coil Ratings

AC Coil

Type	Rated Voltage(Designation)
MR 4	24V, 48V, 110V, 120V,
MR 6	220V, 240V, 380V, 440V,
MR 8	480V

DC Coil

Type	Rated Voltage
MR 4D	12V, 24V, 48V
MR 6D	100V, 110V, 125V,
MR 8D	200V, 220V, 250V

Coil Characteristics

AC Coil (AC 220V, 60Hz)

Type		Electromagnet Capacity(VA)		Power dissipation (W)	Operating Voltage(V)		Operating Time(ms)			
		Inrush	Holding		Pick-up	Drop-out	Coil ON→ acontact ON	Coil ON→ bcontact OFF	Coil OFF→ acontact OFF	Coil OFF→ bcontact ON
MR 4	4a	95	9	2	141~156	105~125	10~17	–	7~13	–
	2a2b				138~148	110~130	8~15	6~15	7~13	8~15
MR 6	6a				145~160	100~120	10~17	–	7~13	–
	3a3b				140~155	105~125	10~16	5~13	7~13	8~15
MR 8	8a				150~160	90~110	10~18	–	7~13	–
	4a4b				148~158	95~115	10~16	5~13	7~13	8~15

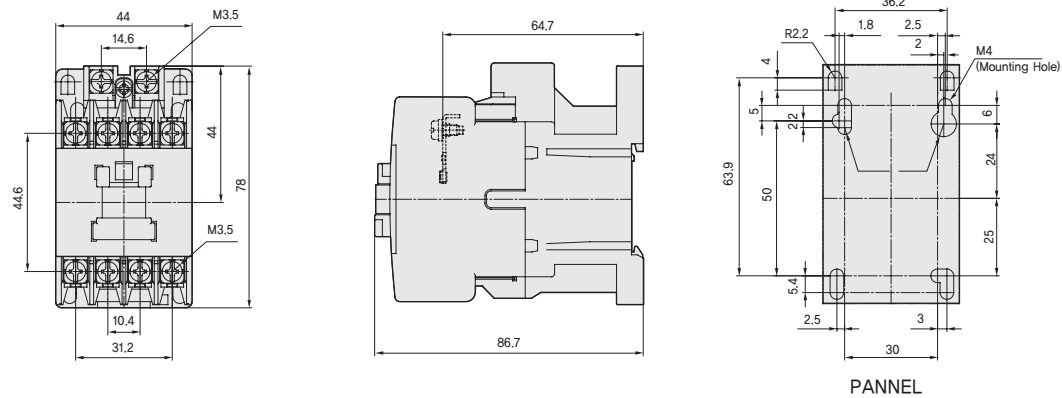
DC Coil (DC 110V)

Type		Electromagnet Capacity(VA)		Thermal Contact (ms)	Operating Voltage(V)		Operating Time(ms)			
		Inrush	Holding		Pick-up	Drop-out	Coil ON→ acontact ON	Coil ON→ bcontact OFF	Coil OFF→ acontact OFF	Coil OFF→ bcontact ON
MR 4D	4a	9	9	50	65~75	15~35	45~55	–	7~13	–
	2a2b				63~73	18~38	40~50	20~30	7~13	13~19
MR 6D	6a				68~78	15~35	45~55	–	7~13	–
	3a3b				63~73	18~38	40~50	20~30	7~13	13~19
MR 8D	8a				70~80	15~35	45~55	–	7~13	–
	4a4b				63~73	18~38	40~50	20~30	7~13	13~19

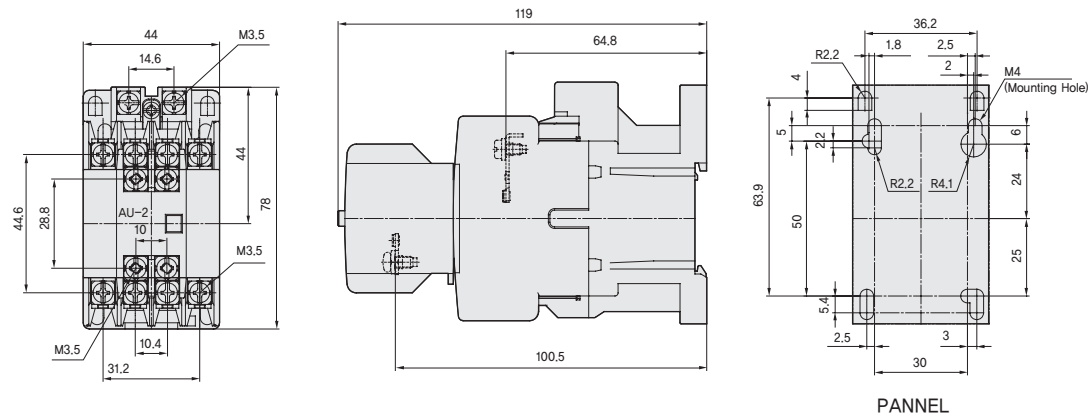
Control Relays

External Dimensions (AC-operated Control Relays)

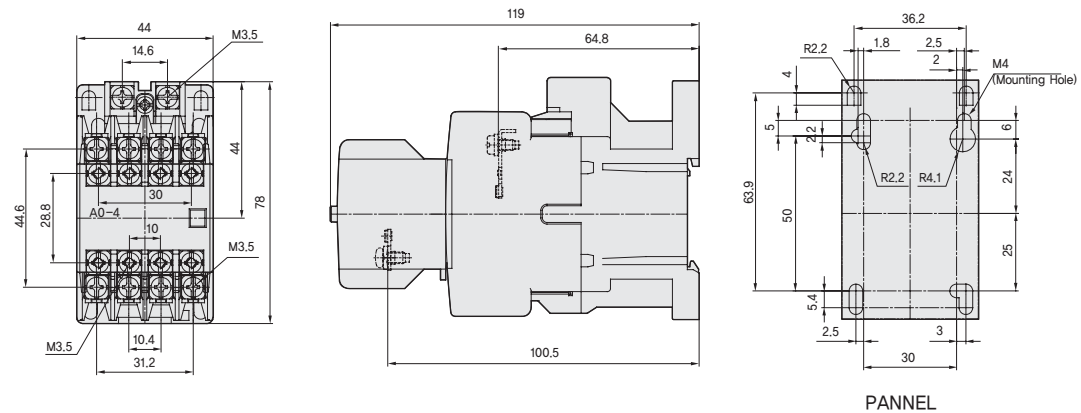
MR 4



MR 6

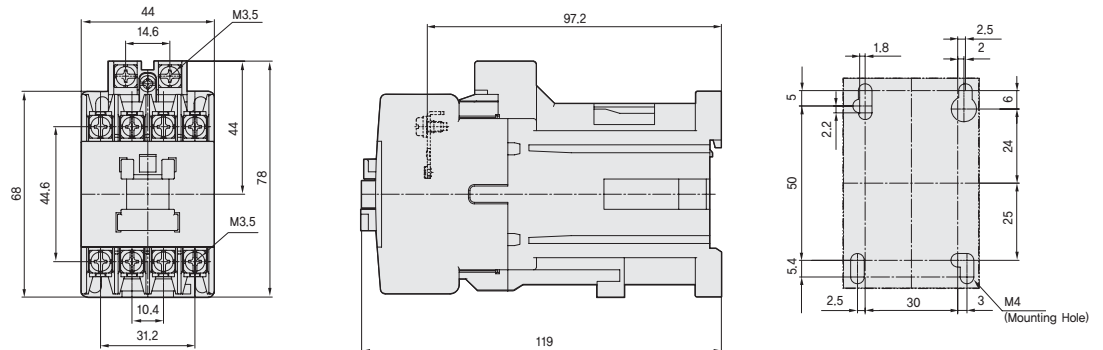


MR 8

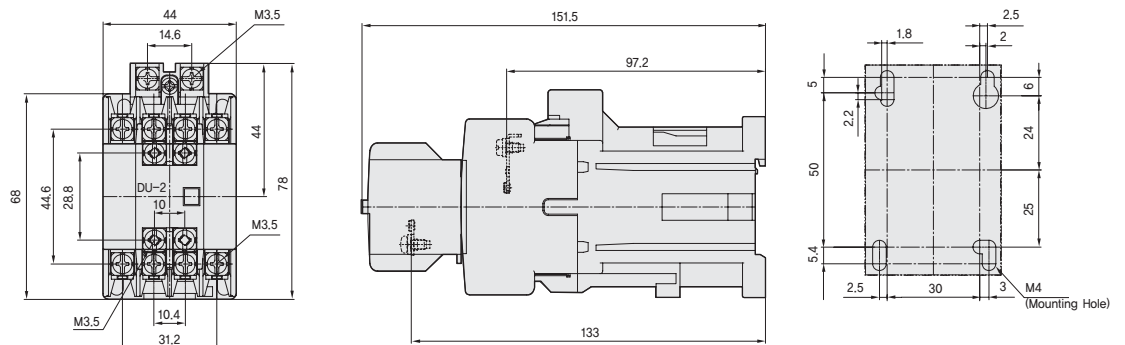


External Dimensions (DC-operated Control Relays)

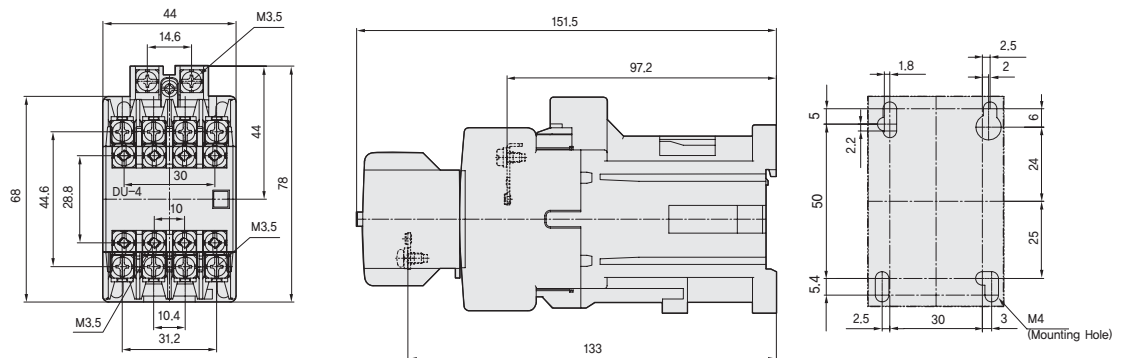
MR 4D



MR 6D

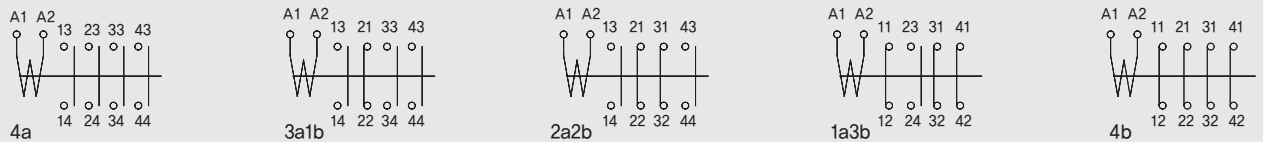


MR 8D

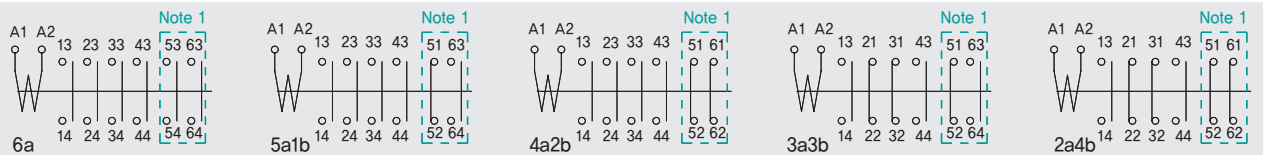


Contact Configurations

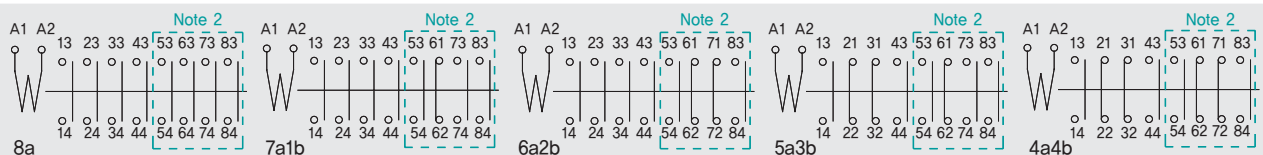
MR4



MR6



MR8



Note 1. AU2(Aux. Contact Unit) 2. AU4(Aux. Contact Unit)

Standard Thermal Overload Relays

Advanced Competitiveness increased by firmly-set basis of future growth and complete technology.

Thermal Overload Relay protects the motor from overload, stall, phase loss operation and burnout.



Characteristics



■ Direct connection to a magnetic contactor

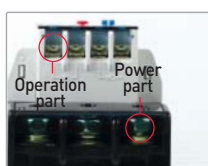
Our thermal overload relays are conveniently connected to a magnetic contactor without any wire
(applicable types : TH 22, 40, 85, 100, 150, 220, 400)



■ Finger proof cover can be installed.

Finger proof cover can be installed for electric conduction parts not to be connected to human body.

*Finger proof cover is an option.



■ Separation of power/operation part

The main circuit and the operation part are separately designed and the operation part is commonly designed for TH 22, 40, 85, 100, 150 for improving safety.



■ Easy operation

• 3 steps current setting

The rated current can be set with a Philips or flat head screw driver.

• Easy in setting Manual-Auto Reset

For the increased convenience of the user, you can select manual reset or automatic reset at your choice.

(Manual Reset)

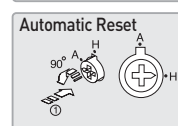
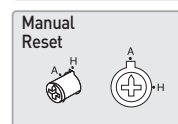
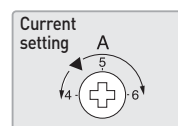
As shown on the right, turn the reset screw so that the arrow mark points to "H" and allow the screw to lift up.

(Automatic Reset)

Push down the reset screw and turn it so that the arrow mark points to "A".

• Trip Indication

If the TOR is tripped, it descends 2~3mm and indicates the tripped condition. When testing manually, lift up the transparent cover and push (Transparent cover is to protect the careless adjustment after setting the contact current by knob).



■ Temperature compensation Bi-metal applied

Separate temperature compensation with the ambient temperature change is not necessary
(Applied ambient temperature: -10°C ~ +40°C).

■ Strong operation part with Vibration Resistance (700g)

■ Separate mounting unit

In case of mounting the overload relays independently, the separate mounting kits are available for panel installation with rail or screw (Applied types: TH 22)



■ Ratings of Auxiliary Contact

Rated Operating Current				
AC15(11) [AC coil load]			DC13(11) [DC coil load]	
110V	220V	550V	110V	110V
1.6	0.8	0.3	0.28	0.14

Combination with a Magnetic Contactor

Magnetic Contactor	Overload Relay
MC 9, 12, 18, 22	TH(K) 22
MC 32, 40, 48	TH(K) 40
MC 50, 65, 75, 85	TH(K) 85
MC 100, 125	TH(K) 100

Magnetic Contactor	Overload Relay
MC 150	TH(K) 150
MC 180, 220	TH(K) 220
MC 300, 400	TH(K) 400

Note We also have the Electronic Over Current Relays (DPR) which can be combined with Magnetic Contactors.
(For more details, please refer to the parts for the Electronic Over Current Relays in this catalog.)

Standard Thermal Overload Relays

Types and Ratings

Subject	Type	TH 22			TH 40			TH 85		
	Nominal	Current Range			Current Range			Current Range		
		Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.
Rated Current(A)	0.14	0.1	0.14	0.16	—	—	—	—	—	—
	0.21	0.16	0.21	0.25	—	—	—	—	—	—
	0.33	0.25	0.33	0.4	—	—	—	—	—	—
	0.52	0.4	0.52	0.63	—	—	—	—	—	—
	0.82	0.63	0.82	1	—	—	—	—	—	—
	1.3	1	1.3	1.6	—	—	—	—	—	—
	2.1	1.6	2.1	2.5	—	—	—	—	—	—
	3.3	2.5	3.3	4	—	—	—	—	—	—
	5	4	5	6	4	5	6	—	—	—
	6.5	5	6.5	8	5	6.5	8	—	—	—
	7.5	6	7.5	9	6	7.5	9	—	—	—
	8.5	7	8.5	10	7	8.5	10	7	8.5	10
	11	9	11	13	9	11	13	9	11	13
	15	12	15	18	12	15	18	12	15	18
	19	16	19	22	16	19	22	16	19	22
	22	—	—	—	18	22	26	18	22	26
	30	—	—	—	24	30	36	24	30	36
	34	—	—	—	28	34	40	28	34	40
	42	—	—	—	—	—	—	34	42	50
	55	—	—	—	—	—	—	45	55	65
	65	—	—	—	—	—	—	54	65	75
	74	—	—	—	—	—	—	63	74	85
No. of Elements	2 Elements	Standard			Standard			Standard		
	3 Elements	Option			Option			Option		
Aux. Contact		1a1b			1a1b			1a1b		
Reset method		Manual/Auto			Manual/Auto			Manual/Auto		
Power loss Note		1.8VA/pole			2.0VA/pole			3.5VA/pole		
Dimension(mm) (W×H×D)		44×63×89			53×71×96			70×81×102		
Separate mounting unit		DZ 22H			—			—		
Application	3 Elements	TH 22/3			TH 40/3			TH 85/3		
	Phase loss protection	TK 22			TK 40			TK 85		
Magnetic Contactor		MC 9, 12, 18, 22			MC 32, 40, 48			MC 50, 65, 75, 85		
Magnetic Switch		MS 9, 12, 18, 22			MS 32, 40, 48			MS 50, 65, 75, 85		

Note. Power loss of Heater

Selection

Full Load Current of Motor (Ref.)				TH 22	TH 40	TH 85
4P 440V 60Hz		4P 220V 60Hz				
P(kW)	In(A)	P(kW)	In(A)			
-	-	-	-	0.1~0.16	-	-
-	-	-	-	0.16~0.25	-	-
0.1	0.36	-	-	0.25~0.4	-	-
-	-	-	-	0.4~0.63	-	-
0.2	0.7	0.1	0.71	0.63~1	-	-
-	-	0.2	1.4	1~1.6	-	-
0.75	1.8	0.4	2.3	1.6~2.5	-	-
1.5	3.3	0.75	3.6	2.5~4	-	-
2.2	4.6	-	-	4~6	4~6	-
-	-	1.5	6.5	5~8	5~8	-
3.7	7.5	-	-	6~9	6~9	-
-	-	2.2	9.2	7~10	7~10	7~10
5.5	11	-	-	9~13	9~13	9~13
7.5	15	3.7	15	12~18	12~18	12~18
-	-	-	-	16~22	16~22	16~22
11	21	5.5	22	-	18~26	18~26
15	28	7.5	29	-	24~36	24~36
18.5	34	-	-	-	28~40	28~40
22	39	11	42	-	-	34~50
30	54	15	55	-	-	45~65
37	66	18.5	67	-	-	54~75
-	-	-	-	-	-	63~85

Types and Ratings

Subject	Type	TH 100			TH 150			TH 220			TH 400		
	Nominal	Current Range			Current Range			Current Range			Current Range		
		Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.
Rated Current(A)	41	34	41	50	34	41	50	—	—	—	—	—	—
	48	39	48	57	39	48	57	—	—	—	—	—	—
	56	43	56	65	43	56	65	—	—	—	—	—	—
	67	54	67	80	54	67	80	—	—	—	—	—	—
	80	65	80	100	65	80	100	65	80	100	—	—	—
	107	85	107	125	85	107	125	85	107	125	85	107	125
	130	—	—	—	100	130	150	100	130	160	100	130	160
	150	—	—	—	—	—	—	120	150	180	120	150	180
	200	—	—	—	—	—	—	160	200	240	160	200	240
	250	—	—	—	—	—	—	—	—	—	200	250	300
	350	—	—	—	—	—	—	—	—	—	260	350	400
No. of Elements	2 Elements	Standard			Standard			Standard			Standard		
	3 Elements	Option			Option			Option			Option		
Aux. Contact		1a1b			1a1b			1a1b			1a1b		
Reset method		Manual/Auto			Manual/Auto			Manual/Auto			Manual/Auto		
Power loss ^{Note}		2,3VA/pole			2,3VA/pole			2,3VA/pole			2,3VA/pole		
Dimension(mm) (W×H×D)		103×67×105			112×89×105			145×141×180			151×171×193		
Application	3 Elements	TH 100/3			TH 150/3			TH 220/3			TH 400/3		
	Phase loss protection	TK 100			TK 150			TK 220			TK 400		
Magnetic Contactor		MC 100, 125			MC 150			MC 180, 220			MC 300, 400		
Magnetic Switch		MS 100, 125			MS 150			MS 180, 220			MS 300, 400		

Note. Power loss of Heater

Selection

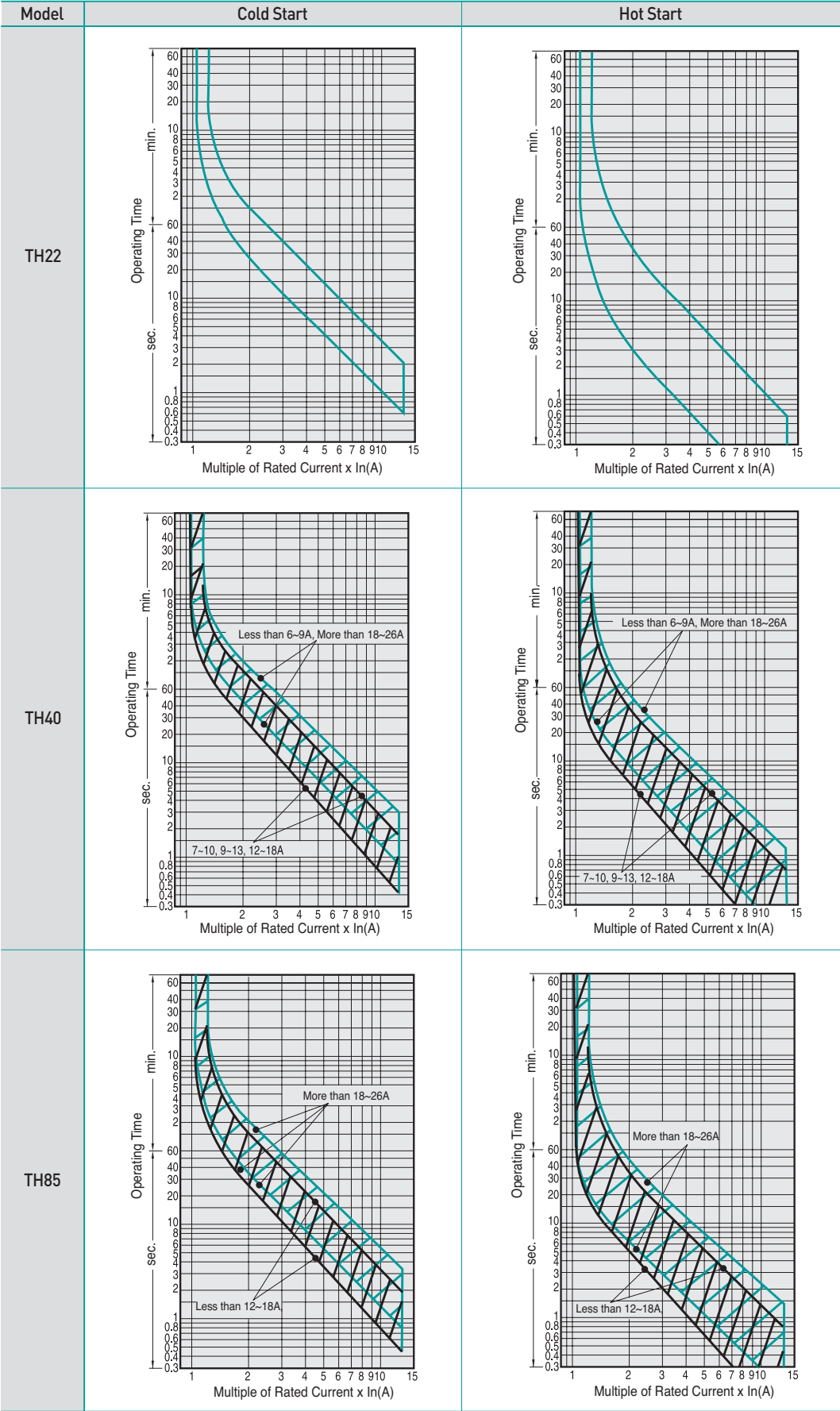
Full Load Current of Motor (Ref.)				TH 100	TH 150	TH 220	TH 400
4P 440V 60Hz		4P 220V 60Hz					
P(kW)	In(A)	P(kW)	In(A)				
22	39	11	42	34~50	34~50	—	—
—	—	—	—	39~57	39~57	—	—
30	54	15	55	43~65	43~65	—	—
37	66	18.5	67	54~80	54~80	—	—
45	80	22	78	65~100	65~100	65~100	—
55	99	30	107	85~125	85~125	85~125	85~125
75	135	37	132	—	100~150	100~160	100~160
90	160	45	160	—	—	120~180	120~180
110	192	55	198	—	—	160~240	160~240
132	226	—	—	—	—	—	200~300
160	265	75	270	—	—	—	—
200	330	90	320	—	—	—	260~400



Standard Thermal Overload Relays

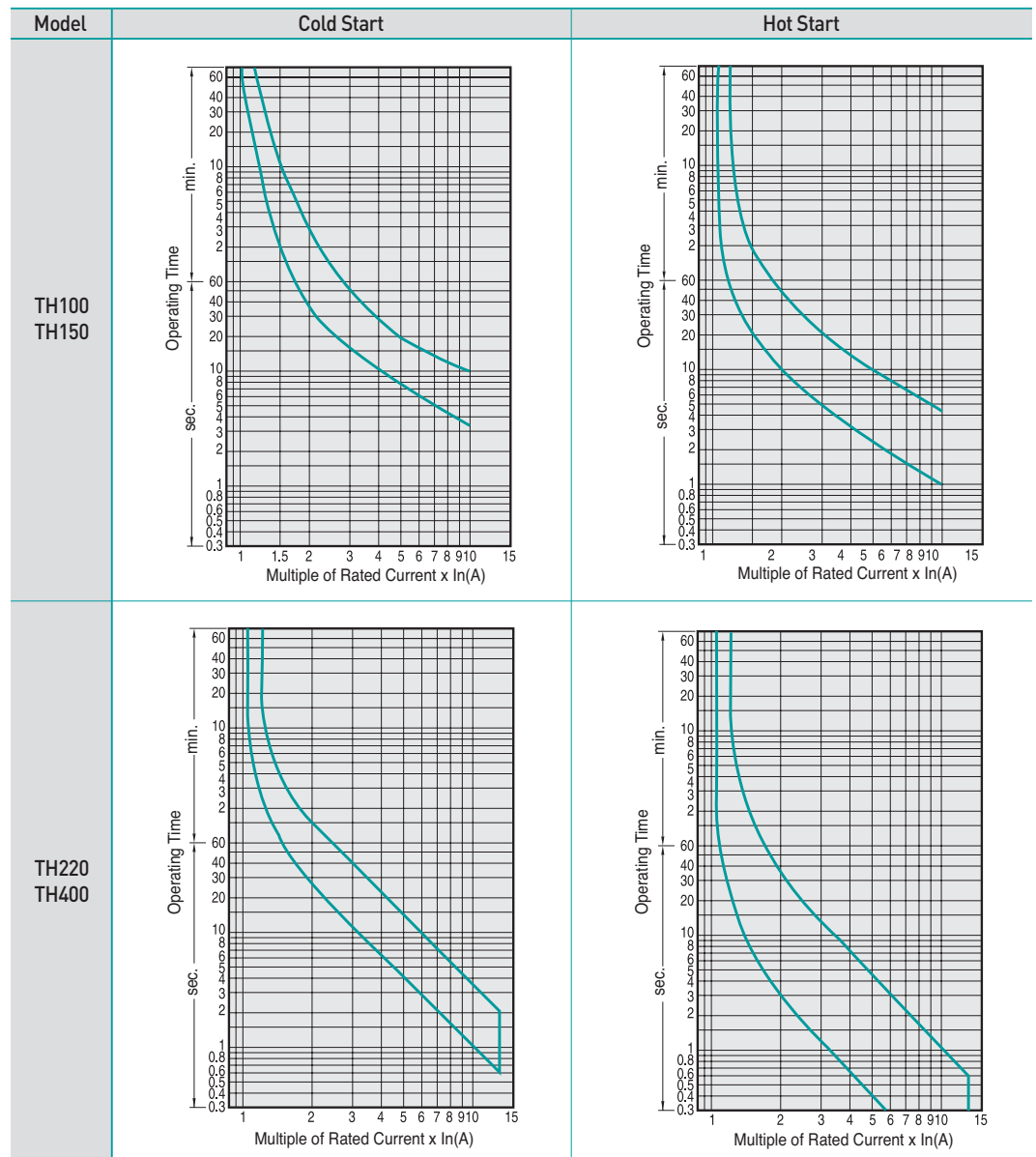
Characteristics Curve

TH22~85





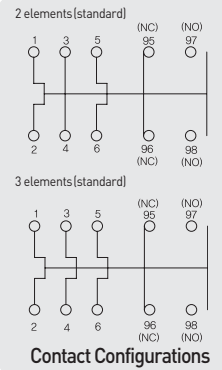
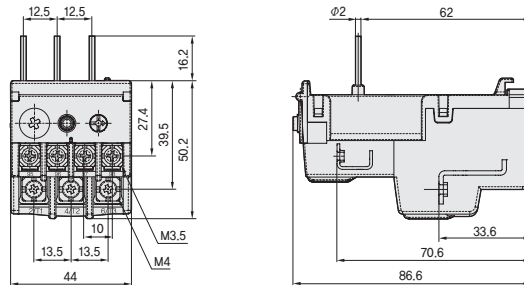
■ TH100~400



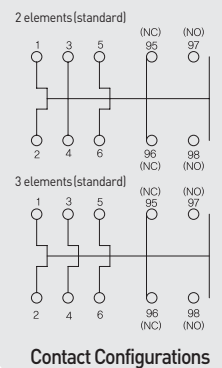
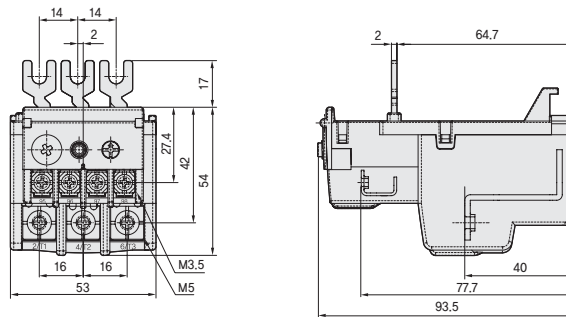
Standard Thermal Overload Relays

External Dimensions and Contact Configurations

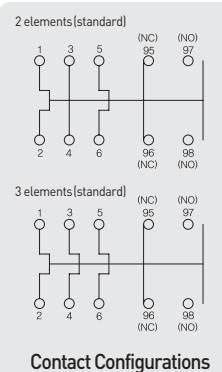
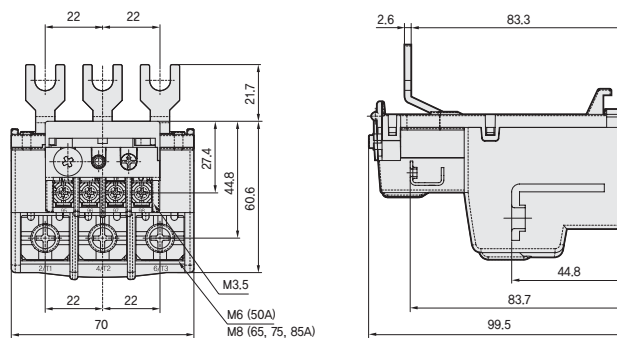
TH 22



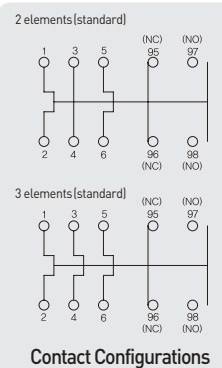
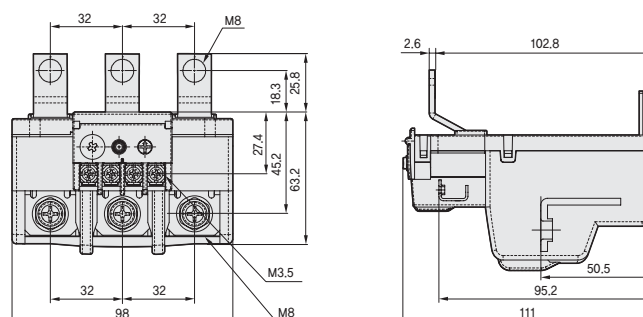
TH 40



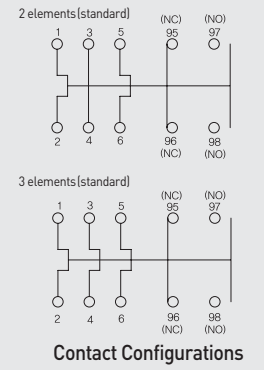
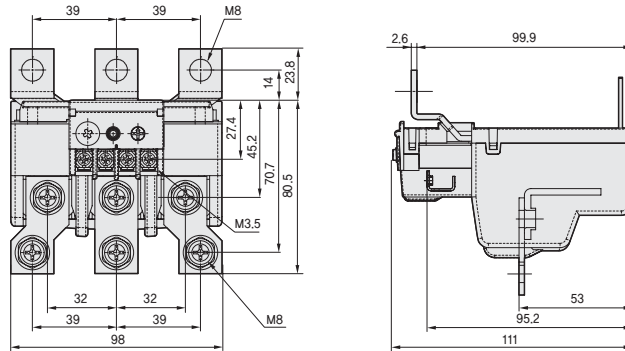
TH 85



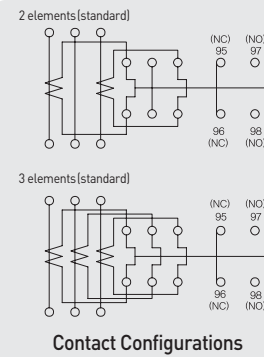
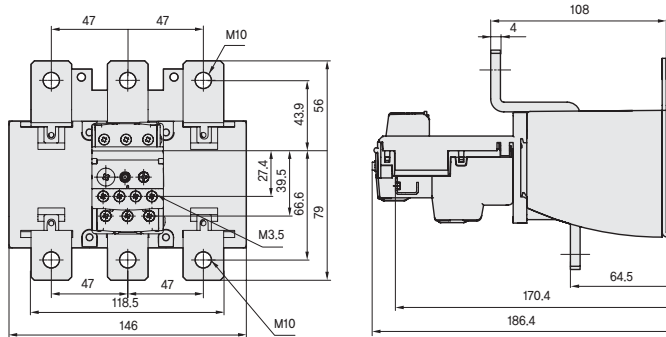
TH 100



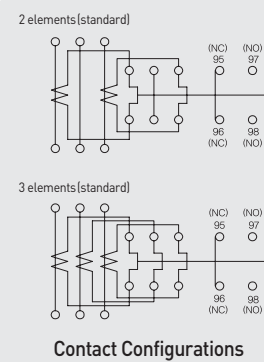
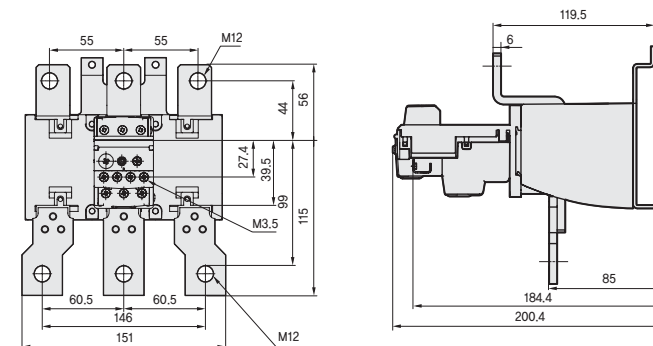
TH 150



TH 220



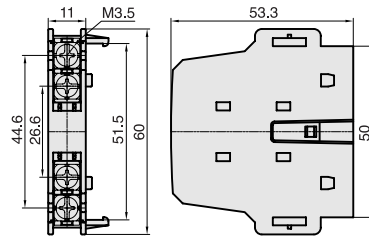
TH 400



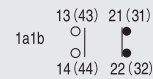
Accessories

External Dimensions and Contact Configurations

AU 1

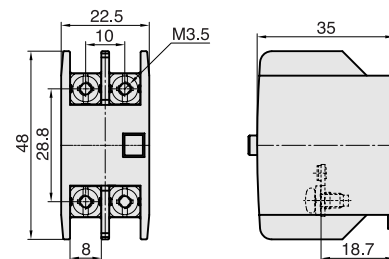


Side-on



Contact Configuration

AU 2

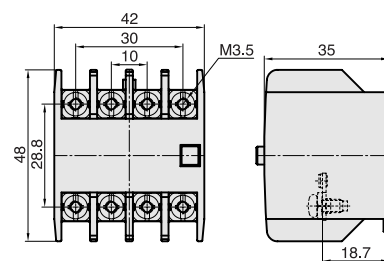


Head-on

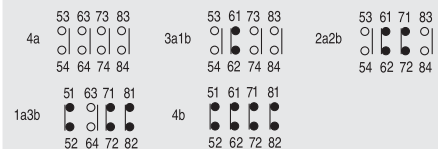


Contact Configuration

AU 4

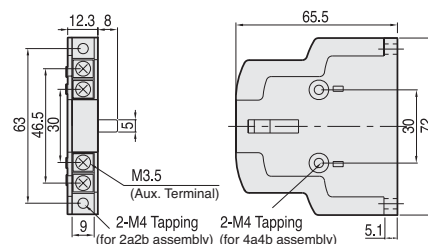


Head-on

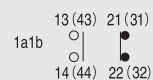


Contact Configuration

AU 100



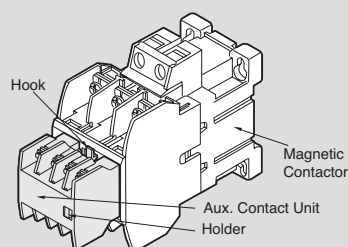
Side-on



Contact Configuration

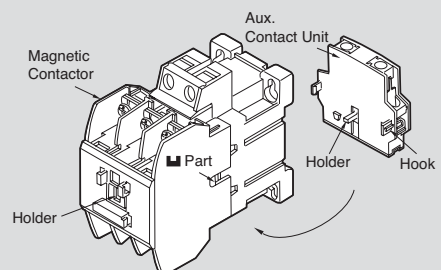
Assembly and Disassembly

AU 2, 4 (Head-on)



- For assembly, set the hook of auxiliary contact unit to the projected part of the head and push it inside.
- After assembling, check if the operation is smooth by pushing holder.
- For disassembly, lift the hook of auxiliary contact unit and remove it.

AU 1 (Side-on)



- For assembly, with the holder of contactor pressed down, set the holder of auxiliary contact unit to the  part and push it.
- After assembling, check if the operation is smooth by pushing holder.
- For disassembly, remove the auxiliary contact unit using a flat head screw driver.

Auxiliary Contact Unit

Mechanical Interlock Units

Type	Magnetic Contactor
DR 9	MC (D) 9 ~ MC (D) 85
DR 100	MC 100 ~ MC 150
DR 180	MC 180 ~ MC 400



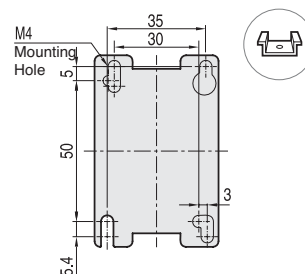
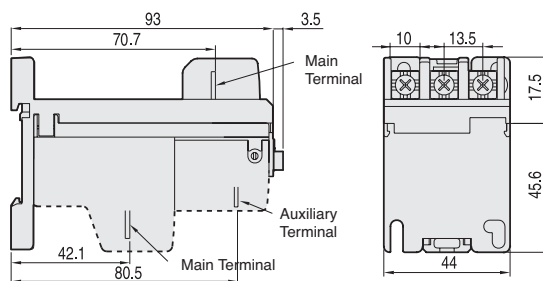
Separate mounting units

Accessory which is used when a thermal overload relay is mounted independently. Screw/Rail mounting is possible.

Type	Thermal Overload Relay
DZ 22H	TH 22

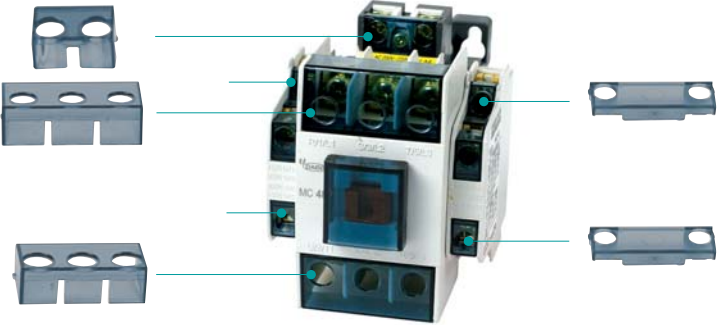
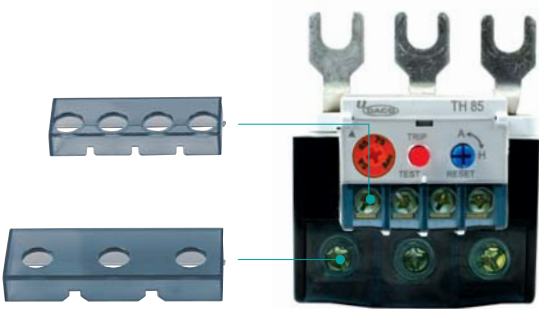


DZ/22 (Separate mounting units)



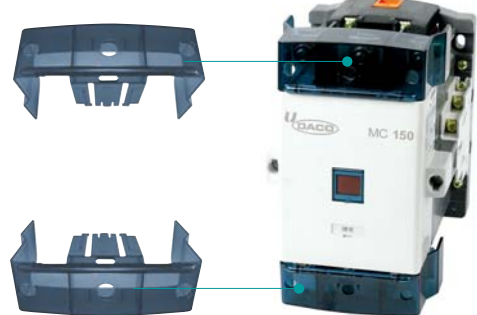
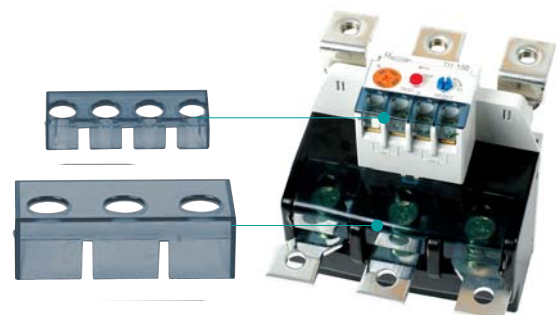
Terminal Covers
(Low Amperes)

Accessory preventing electric shock and foreign materials incoming to terminal parts.

Contactors (Standard)	MC(D)9~85	MC(D)9~22
		
		MC(D)32~85
		
Overload Relays	TH(K)22~85	

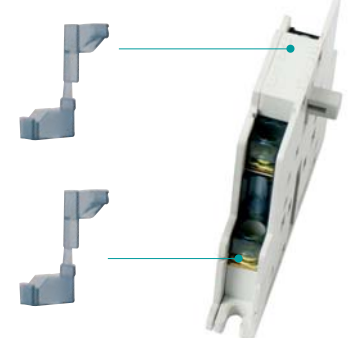
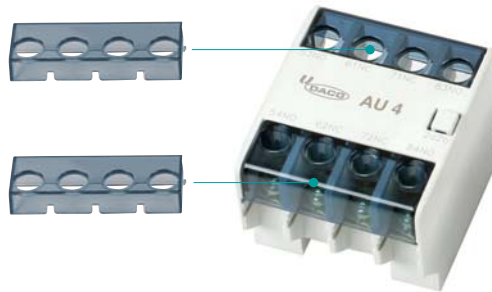
※ Finger proof covers of magnetic contactors and thermal overload relays are optional (Protection Level: IP20).

Terminal Covers (High Amperes)

Contactors	MC100~400	
Overload Relays	TH(K)100~150	

※ Finger proof covers of magnetic contactors and thermal overload relays are optional (Protection Level: IP20).

Terminal Covers (Aux. Contact Units)

Aux. Contact Unit	AU 1	
	AU 2, 4	

※ Finger proof covers of magnetic contactors and thermal overload relays are optional (Protection Level: IP20).

Electronic Over Current Relays

DAERYUK's products have achieved the certifications from the Certified International Quality Management Authorities and we are supplying the believable and precise products by ceaseless technological innovation.

- Phase Reversal and Phase Loss protection by Voltage detection 〈Pass-through type 3ESS〉
 - Detect phase reversal and phase loss by voltage and operate in advance, so it protects load more securely.
- Without the external CT, it is available to use up to 120A.
 - Available in combining with all MCs that are less than 120A of rated current (Max. wire size is 38mm²).
- In Phase Loss, protecting it after O-TIME without experiencing D-TIME.
 - Our 3ESS type is a 2 CT type and a separate phase loss detection circuit is adopted, so that it protects phase loss securely regardless of current setting.
- Troubleshooting for the malfunction due to noise and its cause of defect.
 - With the adoption of the high quality power circuit (licensed), it completely troubleshoots the malfunction due to strong high frequency noise and its cause of defect, which have been the defects of previous products.
- Circuit Design basically increased in reliability by using verified parts only.
 - Designed with the widely-used IC which has been verified its stability for some decades, it completely removes the cause of defects, while the usual electronic over current relays using the one-chip micom, MCU (Microprocessor Control Unit) which is integrated several hundreds of thousands of semiconductors are to be weak to noise in structure.
- Highly convenient for installation and using
 - For the Contactor mounting types, it is more convenient to work with the design of the auxiliary terminal attachment.



Instruction

■ Operation Time setting

Operation Time is based on the scale of the time adjustment dial.

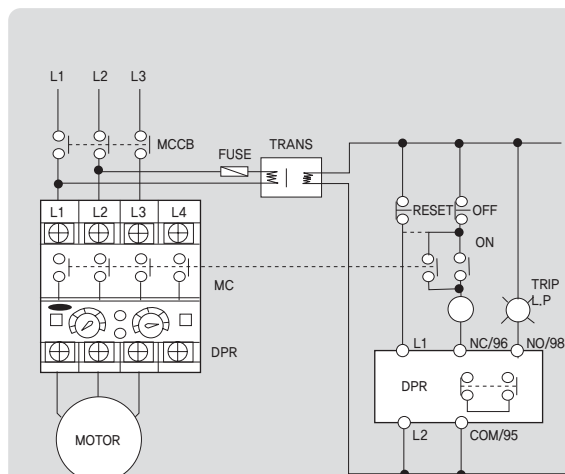
- Set the operation time adjustment dial considering starting time of motor.
- Operation time setting is possible in adjustment.
3ESS/SS3/SS: D-Time 0.2~60 sec, O-Time 0.2~12 sec.
ES2 SP/ES: 0.2~12/0.2~30 sec.

■ Rated Current Setting

- Start the motor setting the current adjustment dial at its maximum.
- Turn the adjustment dial counterclockwise at the operation state and then turn it clockwise slowly from the point where overload indication lamp(O.L) flickers and stop it at the point where the lamp is put out.

■ Operation checking

- If you push the TEST button at the state where only operation power is applied, the over current indication lamp (O.L) of motor protection relay is on and it trips putting out the power lamp after the time set.
- If you push the RESET button, the over current indication lamp is put out and the power lamp is on returning to the initial state.



Ordering Information

DPR

EP

Type	Characteristics		
EP	Contactor mounting	Definite curve	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
SP	"	"	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
ES	Terminal	Separate mounting	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
ES2	Pass-through (2 holes)	Definite curve	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
SS	Pass-through (2 holes)	Definite curve	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
SS1	Pass-through (2 holes)	Inverse curve	(Over Current, Locked rotor, Phase Loss protection, Single phase-(Not) available)
SS3	Pass-through (3 holes)	Definite curve	(Over Current, Locked rotor, Phase Loss protection, Single phase-available)
3ESS	Pass-through (3 holes)	Definite curve	(Over Current, Locked rotor, Phase Loss, Phase reversal protection, Single phase -(Not) available)
UCR	Terminal	Under Current, Phase Loss protection	
GR	Ground Fault protection	Earth Leakage protection	
OVR	Over Voltage protection	Over Voltage protection	
UVR	Under Voltage protection	Under Voltage protection	
NPR	Phase Reversal protection	Phase Reversal protection	
SDDR	Shutdown Delay	Shutdown delay (0~10 sec)	
SSR converter	Temperature Control(Converter)	Input(4~20mA), Used with SSR	

30

220

B

A

Current Setting Range		Control Power		Output Relay		Reset	
01	0.1~1.4A	220	110~220V AC	-	1c (95~96 CLOSE)	-	Manual
06	0.5~6.5A	440	380~440V AC	B	1a1b (95~96 CLOSE)	A	Auto
10	0.5~10A	Others: AC24V (by order)		N	1c (95~96 OPEN)		
30	3~30A						
50	5~50A						
60	5~60A						
120	10~120A						

Electronic Over Current Relays

List of Standard Products



TYPE		Contactor mounting		Contactor mounting			Contactor mounting		Terminal				
Over Current (AC) Relay		SP 10/30		EP 01/06/30			EP 50		ES 01/06/30/50				
Characteristics		Contactor mounting							Stand-alone				
Magnetic Contactor		MC 9~22		MC 9, 12, 18, 22			MC 32, 40, 48		All common products				
Current Setting Range(A)		10	30	01	06	30	50		01	06	30	50	
		0.5~10	3~30	0.1~1.4	0.5~6.5	3~30	5~50		0.1~1.4	0.5~6.5	3~30	5~50	
Operation Characteristics		Definite Curve		Definite Curve (※Inverse Curve)									
Motor Application (kW)	230~240V	1.5	3.7	~0.05	0.12~0.75	0.55~3.7	1.5~7.5		All common products				
	380~460V	3.7	7.5	~0.15	0.25~1.5	1.5~7.5	3.7~11		06 : with CT (infinite capacity)				
Protection	Over Current	○											
	Locked rotor	○											
	Phase Loss	△											
	Phase Reversal	-											
Time setting (sec.)	Operation	0.2~12		0.2~30				0.2~30, 0.2~12, 0.2~30					
	Reset	Manual (Instantaneous) Reset (※Auto Reset 180 sec)											
Control Power	Voltage	180~260V AC		90~260V AC (※380V, 440V AC/DC)									
	Frequency	50/60Hz											
Output Relay	Contact	1C											
	Operation	Normally Closed(COM/95-NC/96-NO/98)											
	Capacity	5A/250V Resistive Load											
Insulation Resistance		Min 50M Ω at 500V DC											
Surge Endurance		2kV(6 times/min.)											
Ambient Temp.	Operation	-25℃~70℃											
	Storage	-30℃~80℃											
Humidity		45~85%RH											
Operation indication		Red LED (O,L) : Over Current Trip		Green LED (P,L) : Power on Red LED (O,L) : Over Current Trip									
Installation		Direct Contactor mounting type							Screw and DIN-Rail (35mm)				

Note. Indicated spec. is upon request.



Pass-through (3 holes)				Pass-through (2 holes)				Pass-through (2 holes)				Terminal (Under Current)		
3ESS 06/30/60/120		SS3 06/30/60/120		SS 06/30/60/120				ES2				UCR 30/50		
Voltage detection type, Phase Reversal protection		Phase Reversal, Over Current protection		Wider Pass-through				Wider Pass-through				Stand-alone, Phase Loss detection		
All common products														
All common products														
06	30	60	120	06	30	60	120	06	30	60	120	30	50	
0.5~6.5	3~30	5~60	10~120	0.5~6.5	3~30	5~60	10~120	0.5~6.5	3~30	5~60	10~120	3~30	5~50	
Definite Curve (※Inverse Curve)														
All common products									All common products (Up to 600A with external CT)				-	
06 : with CT (infinite capacity)												-		
○												Under Current		
○												-		
○									Δ(2CT)			○		
○				-										
D-TIME 0.2~60 / O-TIME 0.2~12									0.2~30					
Manual (Instantaneous) Reset (※Auto Reset 180 sec)														
90~260V AC (※380V, 440V AC/DC)														
50/60Hz														
1C														
Normally Open				Normally Closed(COM/95-NC/96-NO/98)										
5A/250V Resistive Load														
Min 50mA at 500V DC														
2kV(6 times/min.)														
-25℃~70℃														
-30℃~80℃														
45-85%RH														
Green LED (P.L) : Power on Red LED (O.L) : Over Current Trip Yellow LED (PMR) : Phase Reversal Trip				Green LED (P.L) : Power on Red LED (O.L) : Over Current Trip										
Screw and DIN-Rail (35mm)														

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List of Standard Products



TYPE		Ground Fault Protection Relay	Over Voltage Protection Relay		Under Voltage Protection Relay		Phase Reversal Protection Relay	SDDR	
Over Current (AC) Relay		GR	OVR		UVR		NPR	SDDR	
Characteristics		CT 100: 5, ZCT 200mA: 1.5mA	Terminal type				R(Right) phase: Relay 1 output L(Left) phase : Relay 2 output	Solution for the problem that all the related production equipment should be restarted when an instantaneous voltage reduction/power outage happens. (The Wiring method in case that ON S/W is on the Power.)	
CT		Normal CT 100:5 used, not using expensive ZCT(200mA: 1.5mA)	110V TYPE	110~150V	110V TYPE	70~110V	—	—	
Current Setting Range(A)		—	220V TYPE	220~300V	220V TYPE	160~200V	—	—	
Operation Characteristics		—	380V TYPE	380~460V	380V TYPE	300~380V	—	—	
Application		Definite Curve					—	—	
Setting Range									
Protection	Ground Fault	○	—			○	—		
	Over Voltage	—	○	—		—	○		
	Under Voltage	—	—	○		—	—		
	Over Current								
	Phase Loss/ Locked rotor								
	Auxiliary Current								
Time setting (sec.)	Operation	0.2~3	0.2~12			0.1	0.2~5 + 0.2~5 = 10		
	Reset	Manual(Instantaneous) Reset				—			
Control Power	Voltage	L1-L2 90~260V AC	110V/220V/380V/440V			220V/380V	90~260V		
	Frequency	50/60Hz							
Output Relay	Contact	1C							
	Operation	Normally Closed(COM/95-NC/96-NO/98)							
	Capacity	5A/250V Resistive Load							
Insulation Resistance		Min 50MΩ at 500V DC							
Surge Endurance		2kV(6 times/min.)							
Ambient Temp.	Operation	-25℃~70℃							
	Storage	-30℃~80℃							
Humidity		45-85%RH							
Operation indication		Green LED (P,L) : Power on Red LED (O,L) : Over Current Trip				R phase → Red LED(R,L) L phase → Green LED(L,L)		Green LED (P,L) : Power on Red LED (O,L) : Over Current Trip	
Installation		Screw and DIN-Rail (35mm)							

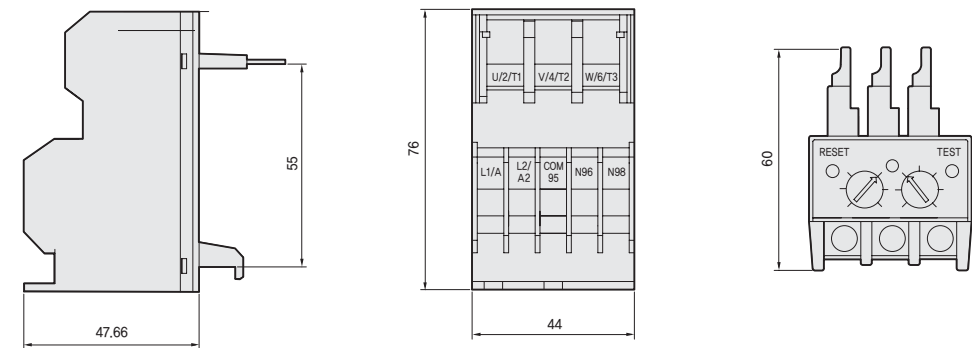


	Ground Fault- Phase Loss Protection Relay				Under Current- Ground Fault Protection Relay				Under Current-Ground Fault- Phase Loss Protection Relay				Under Current-Ground Fault- Phase Loss Protection Relay			
	3ESSG(06/30/60/120)				UCRG(SS3)(06/30/60/120)				UCR(ES2)				UCR(SS2)			
	Over Current/Groud Fault/Phase Loss/Locked rotor protection, Delay times for Starting and Over Current can be set separately, Operating Voltage Range : AC90~260V				Delay times for Ground Fault Current can be set separately, Current Setting Range : 0.5~120A				Under Current/Phase Loss protection Rated Current : 0.5~120A Operating Voltage Range : AC90~260V				Under Current/Phase Loss protection Rated Current : 0.5~120A Operating Voltage Range : AC90~260V			
	Shock Relay of special machines for low voltage induction motor protection				Disconnection in Heater and Ground Fault protection, Under Current and Ground Fault protection, Trouble Monitoring, Alarm				Disconnection in Heater and Under Current protection Trouble Monitoring (2CT)				Disconnection in Heater and Under Current protection Trouble Monitoring (2CT)			
	06	30	60	120	06	30	60	120	06	30	60	120	06	30	60	120
	0.5~6.5	3~30	5~60	10~120	0.5~6.5	3~30	5~60	10~120	0.5~6.5	3~30	5~60	10~120	0.5~6.5	3~30	5~60	10~120
	○															
	○															
	○															
	-															
	Starting Delay : 0.2~60				0.2~30											
	Operation Time : 0.2~12															
	Manual(Instantaneous)/Electrical(Remote)															
	AC90V~260V															
	50/60Hz															
	1C															
	Normally Open(COM/95-NC/96-NO/98)															
	3A/250V(Resistive Load)															
	Min 50MΩ at 500V DC															
	2kV(6 times/min.)															
	-25℃~70℃															
	-30℃~80℃															
	45~85%RH															
	Green LED (P,L) : Power on Red LED (O,L) : Trip Yellow LED (G,L) : Ground Fault Trip				Green LED (P,L) : Power on Red LED (O,L) : Under Current Trip Yellow LED (G,L) : Ground Fault Trip				Green LED (P,L) : Power on Red LED (O,L) : Under Current Trip							
	Screw and DIN Rail(35mm)															

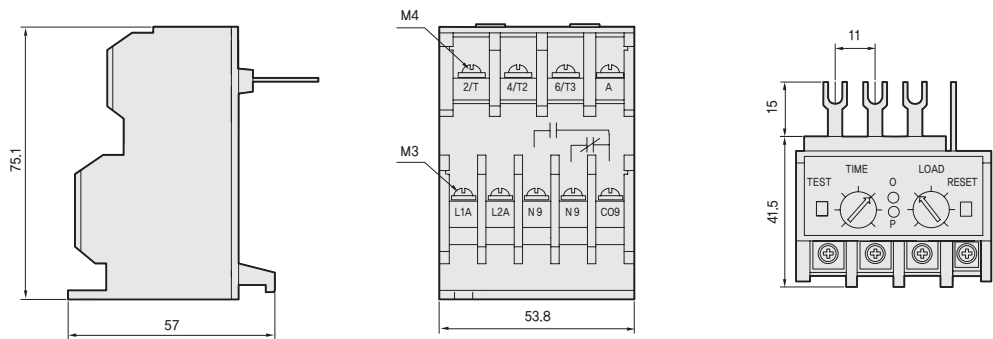
Electronic Over Current Relays

External Dimensions and Contact Configurations

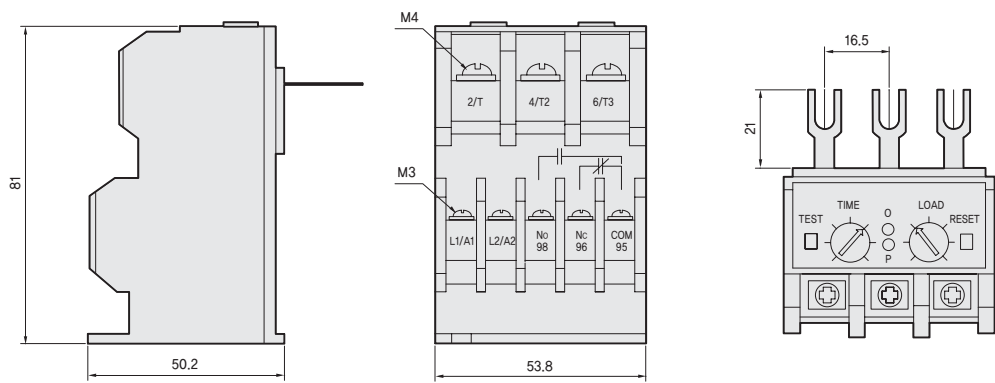
DPR SP
10/30



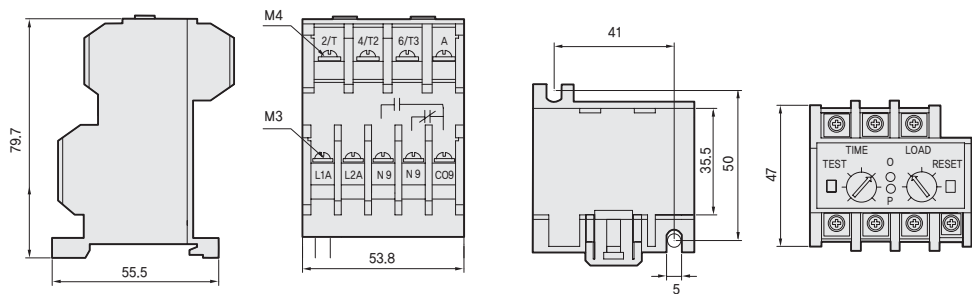
DPR EP
01/06/30



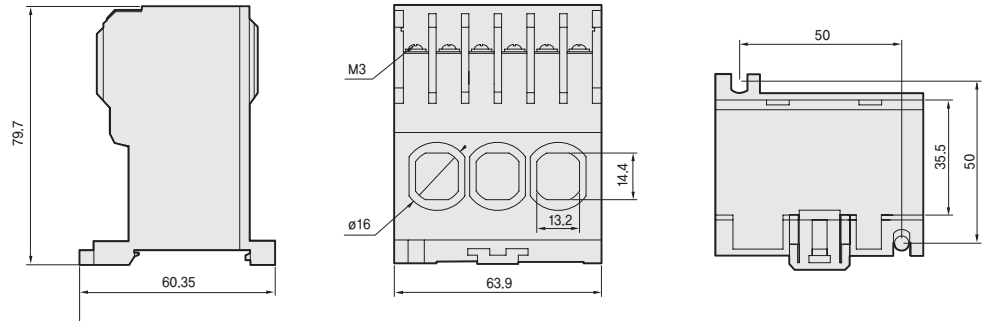
DPR EP 50



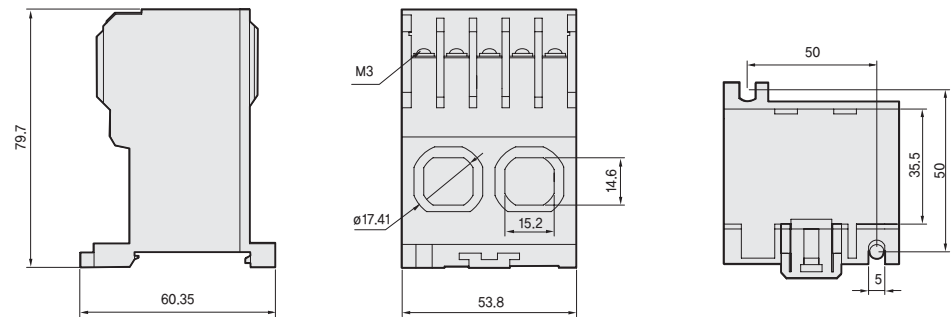
DPR ES
01/06/30/50



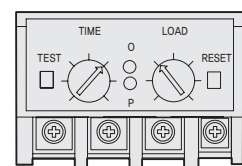
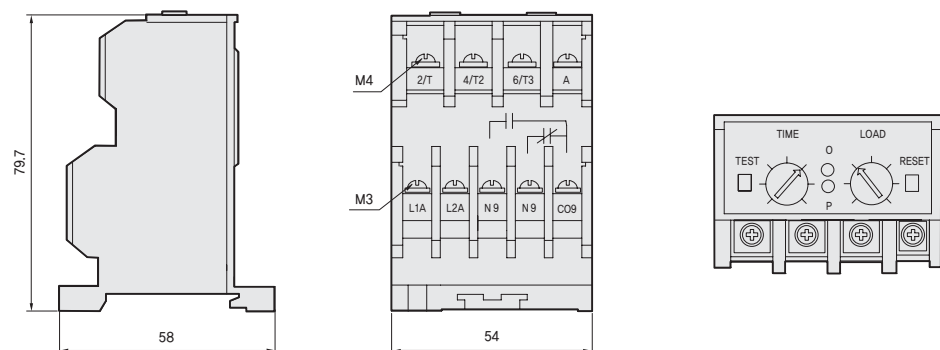
DPR 3ESS
SS3 3ESSG
UCRG(SS3)
UCR(SS3)



DPR SS
ES2
UCR(ES2)



DPR UCR
GR OVR
UVR NPR
SDDR



Technical Information

Type Selection of DPR

Full Load Current of Motor (Ref.)				DPR				
3P 440V		3P 220V						
P(kW)	In(A)	P(kW)	In(A)					
0.1	0.36	-	-	DP/ES-01				
0.2	0.7	0.1	0.71					
-	-	0.2	1.4					
0.75	1.8	-	-	EP/ES/ES2 /SS/SS3-06	SP-10	SP/EP/ES/ ES2/SS/SS3-30		
-	-	0.4	2.3					
1.5	3.3	-	-					
-	-	0.75	3.6					
2.2	4.6	-	-					
3.7	7.5	1.5	6.5					
5.5	11	2.2	9.2					
7.5	15	3.7	15	EP 50 ES2/SS/SS3-60		ES/ES2/SS/SS3-30		
11	21	5.5	22					
15	28	7.5	29		ES2/SS/SS3-120			
18.5	34	-	-					
22	39	11	42					
30	54	15	55					
37	66	18.5	67					
45	80	22	78					
55~	99~	30~	107~	ES/ES2/SS/SS3-06 with external CT				

Terminology

D-TIME : Delay time

When a motor starts up, starting current about 5 to 8 time of the rated operating current flows and starting time defers from load (motor) to load. D-TIME is the time during which starting current is not recognized as over current and activation of the DPR is suppressed. It is set by the D-TIME knob and only operates when a motor starts. The Relay which does not have the D-TIME knob and have a O-TIME knob only is set considering D-TIME and O-TIME.

O-TIME : Over current operating delay time

If over current exceeding the present value flows continuously during operation, the time between the first detection of the over current and the activation of the DPR is adjusted by use of the O-TIME knob. Upon detection of over current, the definite time type activates the DPR after the time set by the O-TIME knob has elapsed. While, the inverse time type activates the DPR according to the current-time characteristic curve selected by the O-TIME knob.

RESET

This is the function to restore the state of the DPR back to the condition it was activated.

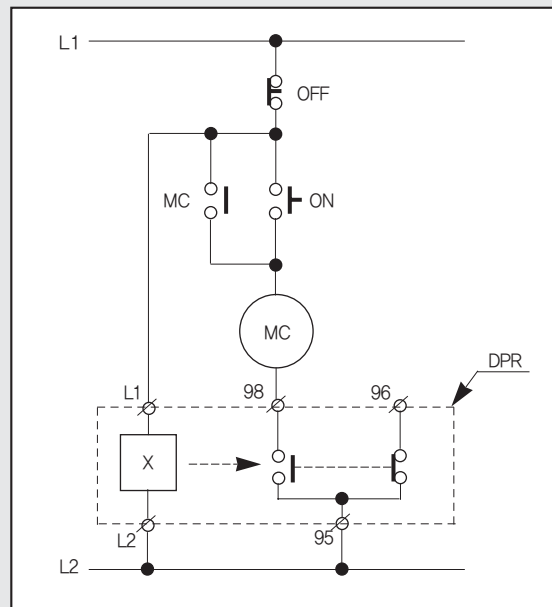
- **Manual Reset** : Pushing the reset button on the front face of the DPR, it is initialized immediately.
- **Electrical Reset** : This method initializes the DPR by cutting off the power source of the control voltage supplied to the DPR. It is initialized by means of a remotely installed "off" button or reset switch.
- **Auto Reset** : This is the automatically initialized function after set time. One is the model that the auto reset time can be set by the user selecting the R-TIME knob or Mode S/W to auto and another is the model that the auto reset time is set when it is dispatched by order.

TEST

It is installed on the front face of the DPR for periodic check and test. While control voltage is normal, continuously pushing the TEST button trips the internal relay after D-TIME + O-TIME has elapsed. You can close the test session by pushing the reset button.

N Type(Fail-Safe Mode/No Volt Release)

This is the fail-safe mode such that, upon application of the control power to L1 and L2 terminals, the internal circuit of the DPR powers on normally and the internal relay is magnetized consisting the sequence normally, but upon the activation of the DPR by over current, the internal relay gets demagnetized. Also called NVR (no voltage release) function, this is the standard mode for the DPR recommended for perfect protection. The mode can be selected by order or the embedded DIP Switch(NVR) according to models.

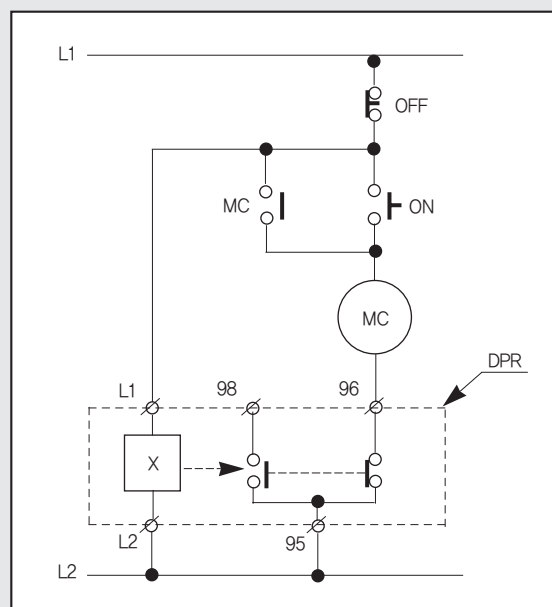


Note

This is for users to find the systematic problem in the early stage by disabling the starting of motor in case control voltage is not applied to the DPR or there is an internal defect or its life span has expired.

R Type(Non-Fail-Safe Mode)

This is the non-fail-safe mode such that the internal relay initially remains demagnetized and so it is possible to drive the load regardless of the conditions of the power to L1 and L2 terminals or the operation of the DPR, while the internal relay gets magnetized upon activation of the DPR by over current. The mode can be selected by order or the embedded DIP Switch(NVR) according to models.



Note

It takes periodic check since the DPR may fail to protect the load if control voltage is supplied abnormally to the DPR or there is an internal defect or its life span has expired.

Cautions (Common)

- Control Power should be connected and supplied exactly to the control power terminal. If the connection to the output terminal is wrong, it may cause the burnout of DPR and short circuit of system. Wiring work after knowing the wiring diagram on the instruction or catalog thoroughly is highly recommended.
- When wiring, followings should be complied.
 - You should do the wiring exactly referring to the 3-line wiring diagram and connect the terminal and wire to keep enough contacts between them.
 - When tightening bolts, you should use a electric screw driver which can keep the rated torque. When working manually, you should not wear down screws by giving force too much at the last stage of tightening and should use a tool matched well with bolts.
- The CT attached in DPR is for the use of current detection to operate DPR, so it should not be used for other purpose. Also, you should not damage on the CT by giving force too much on the wires to penetrate them.
- An operator should check if the DPR is working properly as an protection relay by pushing Test button regularly in the field, so that the DPR is protecting motor soundly.
- When you carry or install DPRs, they should not be impacted severely and fallen. If this case happens, please check the function by Test button or contact our A/S Center.
- In the power systems with the frequency change equipment such as inverter, DPR may be affected by the harmonics generated from this equipment and various noises. In this kind of system, you should supply the control power through tow winding transformer as shown on the example wiring diagram.
- Please refer to the instruction for the A/S about the effective life of DPR.
- You need to choose and use DPRs according to the applied equipment' s characteristics by differentiating N-&R-types for the analogue circuit products.
- Environment and Cautions are as follows;
 - Temperature: Storage (-30~80° C), Operation (-20~60° C). Do not use beyond these ranges.
 - Humidity: 30~85% RH without due condensation. Do not use beyond this range.
 - In the place with much dust, the internal circuit may be weakened by that, so we recommend you to install and operate DPRs preventing dust from incoming and do the cleaning regularly.

Inverse Curve vs. Definite Curve

Definition

- Inverse Curve DPR: If the current flows with more than the setting value(appropriate current), the Trip Time of DPR differs by the over current value
- Definite Curve DPR : If the current flows with more than the setting value(appropriate current), DPR operates and trips the circuit after certain period of time (setting time) regardless of the over current value.

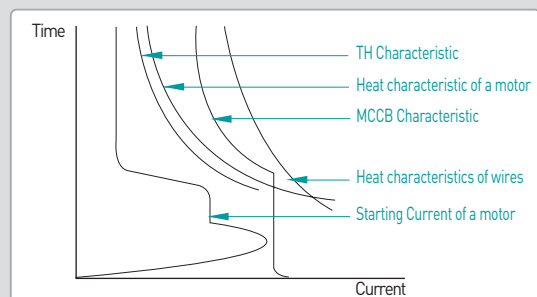
Considerations for the selection of appropriate DPR for the load protection

DPR is mainly used for the protection of motors in the industrial field. The thing which may be overlooked in selecting DPRs is how similar the types of heat characteristics curve of motor and DPR are.

The heat characteristics curve of motor is based on the curves for coils used for rotor and stator, so it shows similar curve to those for coils. Also, the heat characteristics curves of various wires used in the industrial fields like various distribution panels including MCC are usually showing similar curves to that of motor along with the wire connected to motor. Therefore, the relays having similar operation characteristics to this feature should be used in the sequence using motors for the protection of wires and motors.

The characteristics curves of MCCB usually used in distribution panels are also showing the similar curves to those for motors, so, in terms of the protection assistance among the protection equipments, DPRs having the characteristics need to be used.

The Definite Curve DPRs are mostly used for motor protection because the time and current settings are easy to control and the operation can be checked easily, but the Inverse Curve DPRs are most suited for more secured motor protection or the protection for high quality motors because their curves are very similar to the heat characteristics curves of motors.



Type	Trip time in Over Current	Operation Characteristic Curve	Trip in short circuit during motor operation	Appropriate Load
Definite Curve	Constant (fixed time)	Straight Line(parallel to current)	Normal overload trip	Fixed load such as Heater, Electronic Circuit, Lighting, etc.
Inverse Curve	Differential trip according to the over current value	Similar to the heat characteristics curve of motors	Shortest time trip	Motor



Classification of Definite & Inverse Curve DPR by application

- Definite Curve DPR : Loads almost having no change in the starting and operating currents
- Inverse Curve DPR : Loads showing inverse curves in the heat characteristics curves
- Heater, General Lighting product, Electronic Circuit, etc.
- Motor, etc.

Characteristics Curves

The Characteristic Curve of the Inverse Curve DPR is classified into the Cold Curve and Hot Curve.

- **Cold Curve** : The curve applied when a motor initially starts. The curve is 6 to 8 times of normal operating current (For motors, the starting current is 600 to 800% of normal current).
- **Hot Curve** : The curve applied during a motor operates. It is similar to the heat characteristic curve of a common motor, so it is more efficient in protecting a motor by choosing the close point to the motor's critical temperature as a protection point.
- For DPR, the characteristic curve shows the Cold Curve when the motor is initially starting and Hot Curve after the setting time.
Ex) When starting, if the operating time is set at 10 sec, it shows Cold Curve. After the setting time, it shows Hot Curve. During the operation, it trips though 600% of rated current flows for only 1.3 sec. according to the Hot Curve characteristic.

Caution

Inverse Curve DPR may trip in case motor is restarted several times in serial, so please restart it with minimum 3 sec. interval. The motor with frequent direct-reverse operation should be used extending the setting time a little. However, please consult with us for the application of crane and hoist.