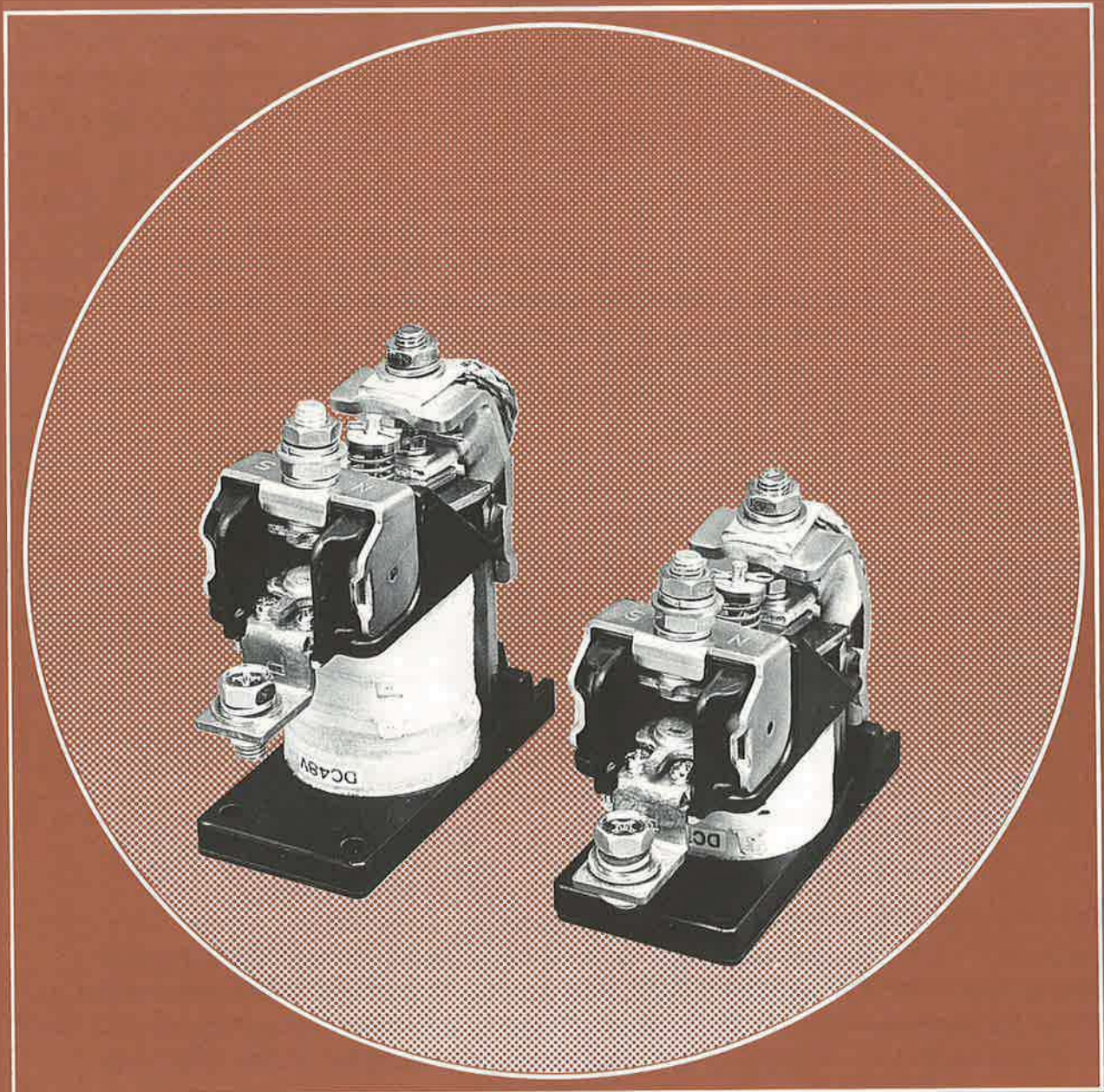


CM SERIES

DC CONTACTORS



Kyoritsu's "CM series" DC contactors are designed for forward and reverse switching and speed control of DC motors used in such battery-powered vehicles as fork-lifts, lift pallet vehicles and fixed platform trucks

A Rich Variety of Models

Model	Rated current (A)	Main contact rating						Coil rating			
		Rated operating voltage			Contact arrangement			Switching condition			
		12	48	72	1A	1T	1T × 2	A contact	B contact	Continuous control 8H	Chopper control f=1msec
						Load switching	Conducting	Conducting			
CM2-A□	20		○		○		○			○	
CM4-T□	40	○			○		○		○	○	
CM4-TW□						○	○		○	○	
CM4-TX□			○			○	○		○	○	
CM4-TXW□			○			○	○		○	○	
CM8S-A□	80		○		○		○		○	○	
CM8S-T□			○			○	○		○	○	
CM8S-TW□			○			○	○		○	○	
CM8S-AC□			○		○			○			○
CM8S-TC□			○			○		○	○		○
CM8S-TCW□			○			○		○	○		○
CM8S-AC□3			○		○			○		○	
CM8S-TC□3			○			○		○	○		○
CM8S-TC□3W			○			○		○	○		○
CM8S-A□10			○		○			○			○
CM8S-T□10			○			○		○	○		○
CM8S-T□10W			○			○		○	○		○
CM16-A□	160		○	○			○		○	○	
CM16-T□			○		○		○		○	○	
CM16-T□W			○			○		○	○		○
CM16-AC□			○	○				○		○	
CM16-TC□			○		○			○	○		○
CM16-TC□W			○			○		○	○		○
CM16-A□2			○	○				○			○
CM16-T□2			○		○			○	○		○
CM16-T□2W			○			○		○	○		○
CM16-AC□2			○	○				○			○
CM16-TC□2			○		○			○	○		○
CM16-TC□2W			○			○		○	○		○

- The models with W effect forward and reverse operation (F & R type) by a combination of two 1T's.
- The coil voltages available as standard are 12, 24, 48 and 72 VDC. Other voltages are available to order, however.

Long Life and High Reliability

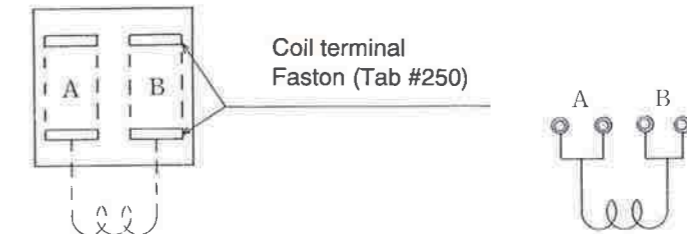
- Mechanically, the contactor mechanism displays an assured life of 5 million times of operation.
- Electrically, the DC contactor assures 500,000 times or more of operation under normal service.
- The contacts of special silver alloy show high resistance to welding and wear as well as low contact resistance.
- A permanent magnet arc-suppressing system is employed to extinguish arcs immediately.

Easy Location

- Compact size allows installation of the DC contactor in limited space of the vehicle.
- Installation is possible in two directions to facilitate wiring from up or down depending on the design of the vehicle.

Easy Installation

- Installation can be performed quite efficiently because the DC contactor can be mounted directly on a metal plate without use of an insulation plate.
- Wiring can be done front ways.
- Faston (Tab #250) is used for the coil terminals. Each terminal is provided with two connecting points so as to facilitate branching.



Maintenance

- The contacts, which can be seen from front, can be checked easily for wear or other trouble if any.
- The contacts can be replaced frontally.

Reference Standards

- JEM – 1038 Electromagnetic Contactors (1990)
- JEM – 1103 Insulation Distances of Controllers
- JEM – 1029 Limit Temperature Rises of Controllers
- JEM – 1021 Insulation Resistances and Withstand Voltages of Controllers
- UL – 583 Safety Standards for Motor-Operated Industrial Vehicles (Battery Power) Section 18 Arc Damage Tests
- JIS D 1601 Vibration Test Methods for Automotive Parts

Selection of Coil Surge Killer

A surge voltage 10 to 20 times the control voltage occurs if coil current of the DC contactor is shut off quickly. When you use a diode or surge absorbing device to suppress the surge voltage, observe the following notes :

1. When a diode only is added as a surge voltage suppressing device (see Fig. 1), the reset time of the DC contactor will become longer and the reset speed slower. This will slow the opening speed of the contact, thus affecting adversely the breaking performance and life. When you use a diode, therefore, connect a resistance in series with the diode. (See Fig. 2.)

As for the diode ratings, select the average rectifying current equivalent to the coil current of the DC contactor and the repetitive peak reverse voltage 10 times or more the control voltage.

Use a resistance value about two times the coil resistance of the DC contactor, then the surge voltage will be suppressed to the level of control voltage (In this case, too, the reset time will be slightly longer.)

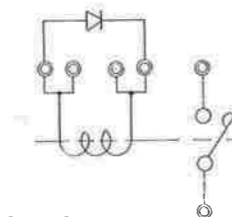


Fig. 1 Diode only

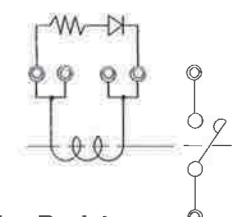
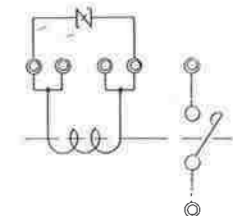


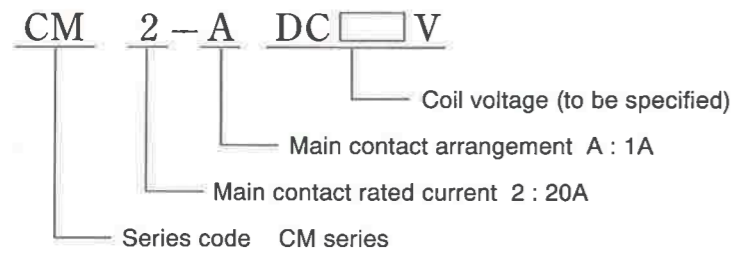
Fig. 2 Diode + Resistance

2. When a varistor is added as a surge voltage suppressing device, select the varistor voltage (VC) as follows (In this case, too, the reset time will be slightly longer.) :

$$\text{Operating contact withstand voltage (Operating semiconductor withstand voltage)} > \text{Varistor voltage (VC)} > \text{Control voltage}$$



Model Designation

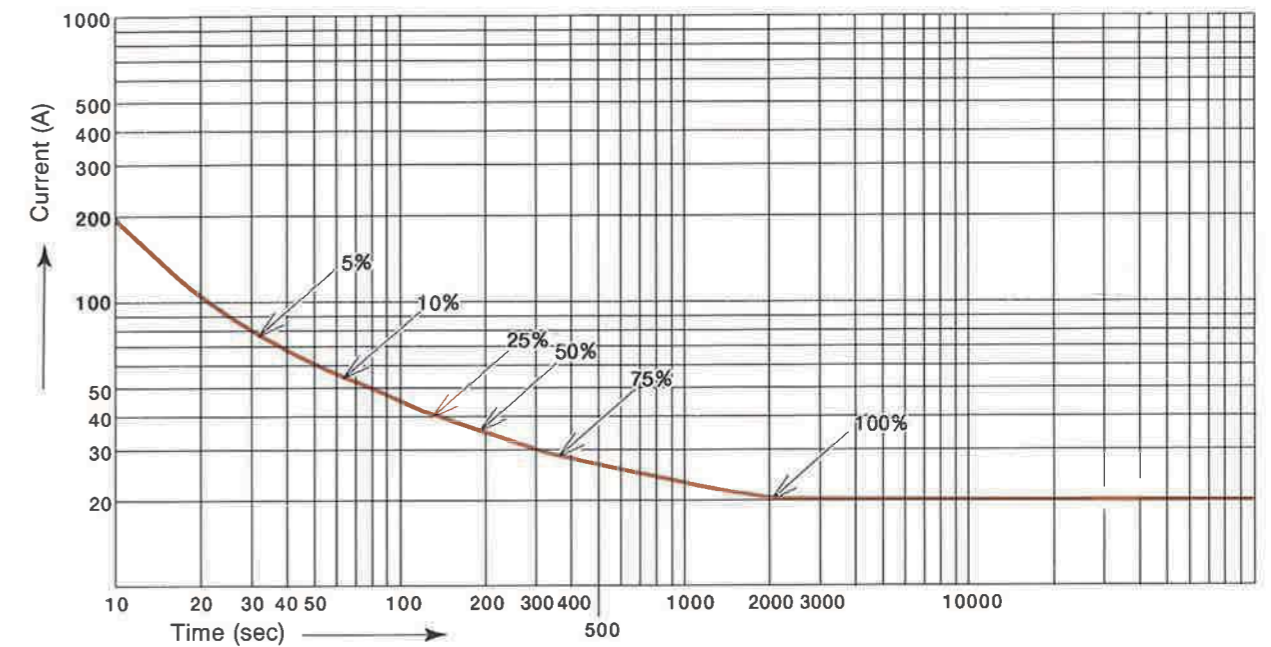


Performance

Main contact rated voltage		DC 48V			
Main contact rated current		20A continuous			
Main contact arrangement		1A			
Main contact capacity	Condition	Making	Breaking	Time constant	No. of times
	Make & break capacity	150 A	150 A	L / R=15 ms	125 times
	Rated working current ※1	80 A	20 A	L / R=10ms	500,000 times
Switching frequency		1200 times / hour			
Coil	Voltage	DC 12V	DC 24V	DC 48V	
	Current	0.7 A	0.36 A	0.18 A	
	Resistance	17.2 Ω	66.6 Ω	266.6Ω	
	Power consumption	8.5 W			
	Insulation class	B class			
Min. pickup voltage		70% or below of rated voltage (hot coil)			
Release voltage		5% ~ 30% of rated voltage			
Insulation resistance		5MΩ or above (DC500V megger)			
Withstand voltage		AC 1500V 50 / 60 Hz One minute			
Ambient temperature		- 20°C ~ +60°C (no condensation)			
Relative humidity		45% ~ 85% RH			
Vibration resistance (X, Y, Z directions)		5G in excited state		4G in non-excited state	
Shock resistance (X, Y, Z directions)		8G in excited state		4G in non-excited state	
Mechanical life		5 million times			
Electrical life		500,000 times (when used under condition of ※ 1)			
Weight		0.25 kg			

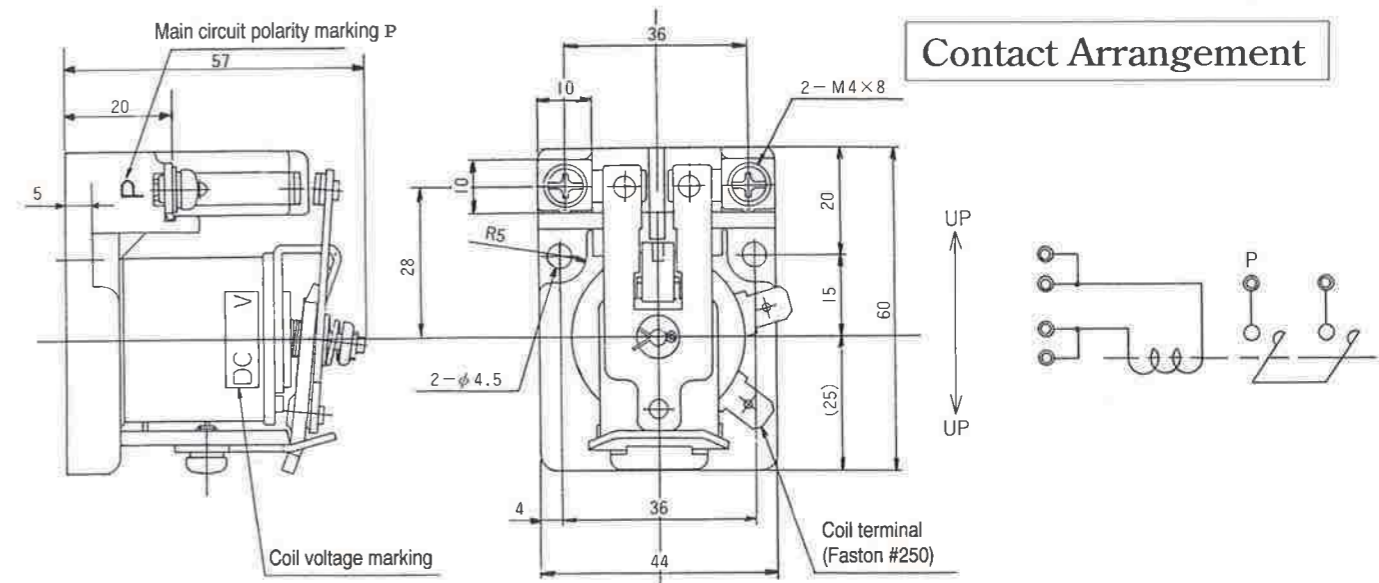
- NOTES**
- The current and resistance values of the coil represent those at an ambient temperature of +20°C, and the tolerance on them is ±10%.
 - The minimum pickup voltage represents that at an ambient temperature of +60°C and hot coil start.

Relationship between Current, Max. ON Time and Duty Cycle



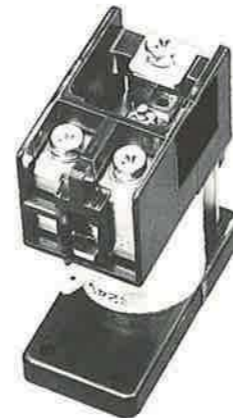
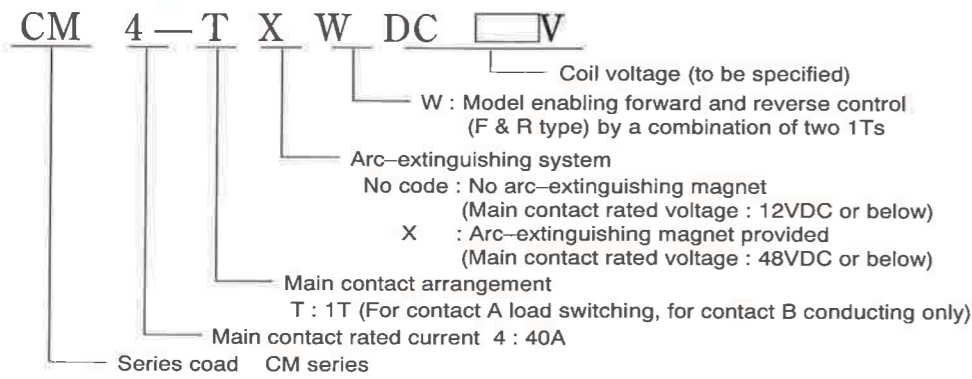
Duty cycle	5% ED	10% ED	25% ED	50% ED	75% ED	100% ED
Current	70 A	50 A	40 A	35 A	28 A	20 A
Max. ON time	30 sec	60 sec	120 sec	180 sec	360 sec	Continuous
OFF time	570 sec	540 sec	360 sec	180 sec	120 sec	-

Overall Dimensions



- NOTES**
- Use 11 to 14 kg·cm as the tightening torque of the main circuit terminal (M4).
 - Connect the positive pole (+) to the terminal marked with the main circuit polarity marking P. (The contactor structure is such that arc is led out front by a built-in magnet.)
 - Install the DC contactor with the UP side up.
 - Provide a space of 10 mm or more between contactors when two or more contactors are to be installed side by side.

Model Designation

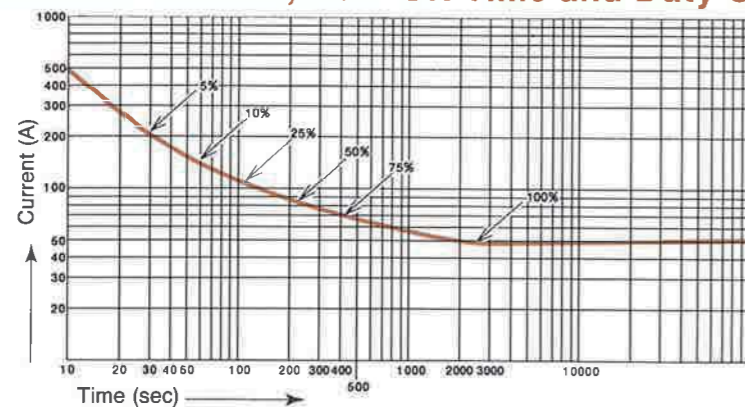


Performance

Main contact rated voltage		DC 12V		DC 48V	
Main contact rated current		40A continuous			
Main contact arrangement		1T			
Main contact capacity	Condition	Making	Breaking	Time constant	No. of times
	Make & break capacity	500 A	500 A	L / R=15 ms	125 times
	Rated operating current ※1	200 A	50 A	L / R=10ms	500,000 times
Switching frequency		1200 times / hour			
Coil	Voltage	DC 12V	DC 24V	DC 48V	
	Current	0.76 A	0.38 A	0.19 A	
	Resistance	15.8 Ω	63.2 Ω	252.6Ω	
	Power consumption	9 W			
	Insulation class	B class			
Min. pickup voltage		70% or below of rated voltage (hot coil)			
Release voltage		5% ~ 30% of rated voltage			
Insulation resistance		5MΩ or above (DC500V megger)			
Withstand voltage		AC 1500V 50 / 60 Hz One minute			
Ambient temperature		- 20°C ~ + 60°C (no condensation)			
Relative humidity		45% ~ 85% RH			
Vibration resistance (X, Y, Z directions)		6G in excited state		5G in non-excited state	
Shock resistance (X, Y, Z directions)		8G in excited state		4G in non-excited state	
Mechanical life		5 million times			
Electrical life		500,000 times (when used under condition of ※1)			
Weight		0.3 kg			

- NOTES**
- Beware that contact B is capable of conducting only and not breaking.
 - The current and resistance values of the coil represent those at an ambient temperature of +20°C, and the tolerance on them is ± 10%.
 - The minimum pickup voltage represents that at an ambient temperature of +60°C and hot coil start.

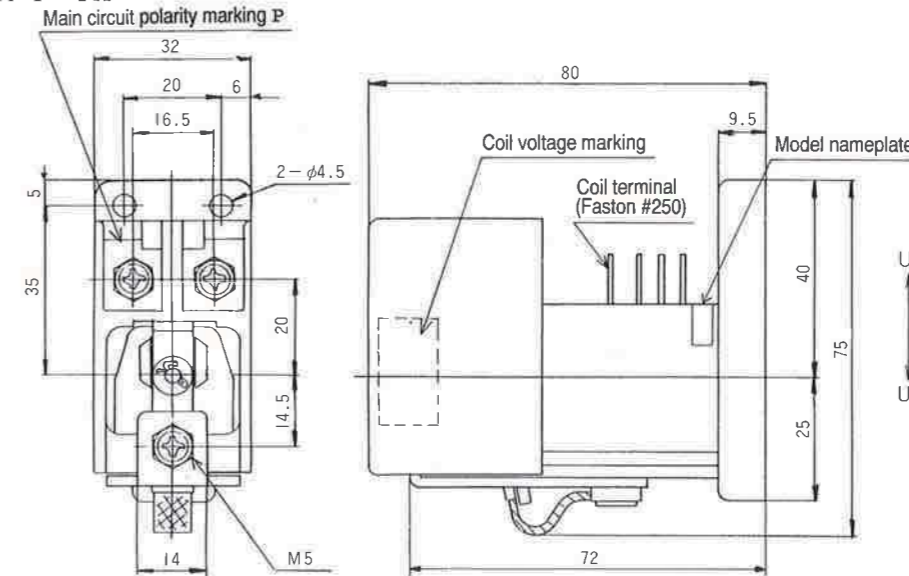
Relationship between Current, Max. ON Time and Duty Cycle



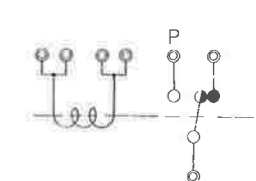
Duty cycle	5% ED	10% ED	25% ED	50% ED	75% ED	100% ED
Current	220 A	160 A	120 A	90 A	70 A	50 A
Max. ON time	30 sec	60 sec	120 sec	240 sec	420 sec	Continuous
OFF time	570 sec	540 sec	360 sec	240 sec	140 sec	-

Overall Dimensions

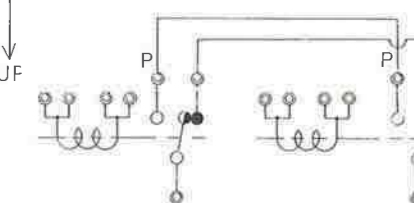
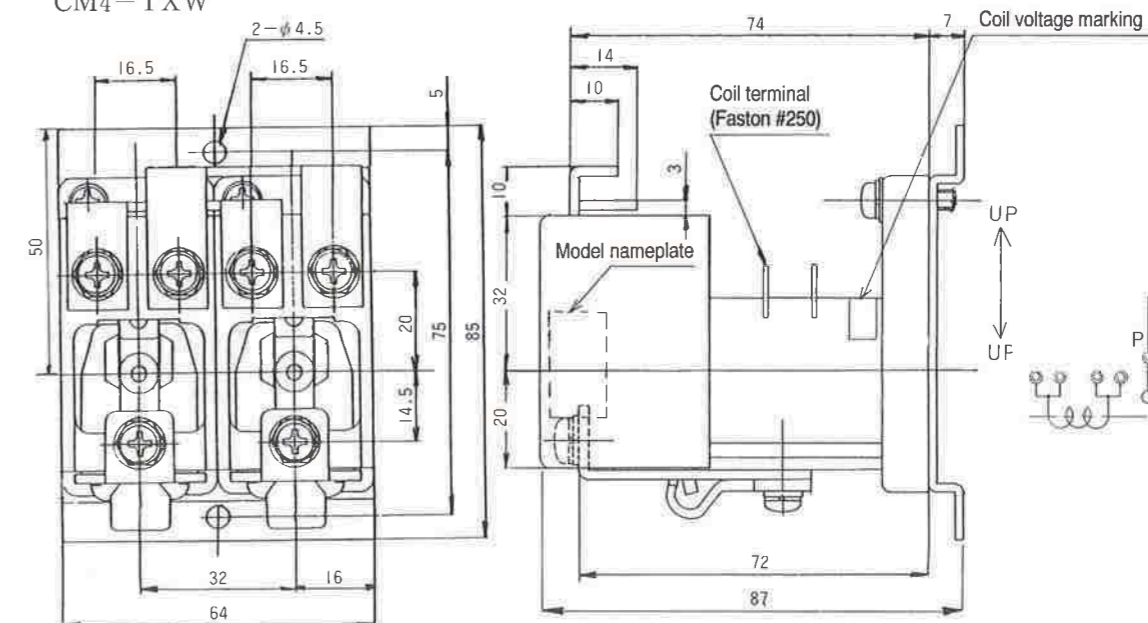
CM4-T · TX



Contact Arrangement

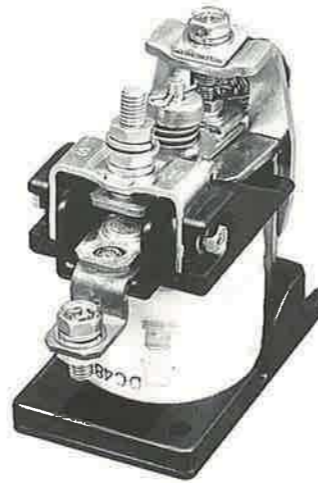
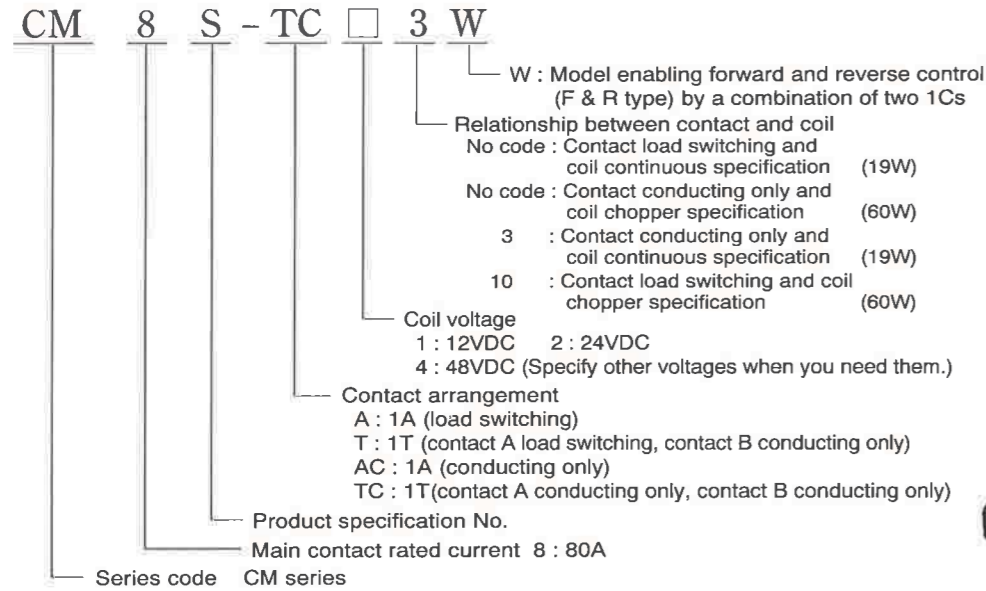


CM4-TXW



- NOTES**
- Use 21 to 28 kg · cm as the tightening torque of the main circuit terminal (M5).
 - Connect the positive pole (+) to the terminal marked with the main circuit polarity marking P. (The contactor structure is such that arc is led out front by a built-in magnet)
 - Install the DC contactor with the UP side up.

Model Designation

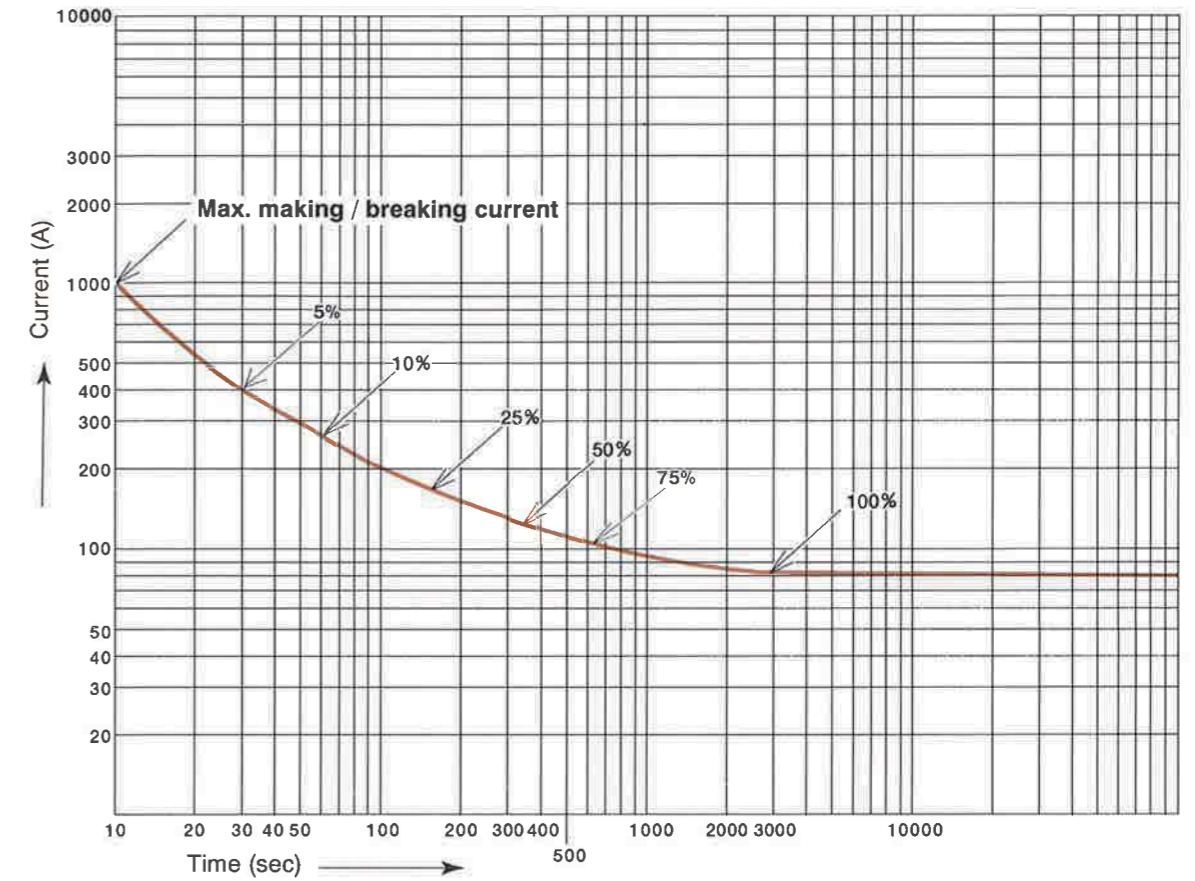


Performance

Main contact rated voltage		DC 48V			
Main contact rated current		80A continuous			
Main contact arrangement		1A		1T	
Main contact capacity	Condition	Making	Breaking	Time constant	No. of times
	Make & break capacity	1000 A	1000 A	L / R=15 ms	125 times
	Rated operating current ※1	320 A	80 A	L / R=10ms	500,000 times
Switching frequency		1200 times / hour			
Coil	Continuous 8H	Voltage	DC 12V	DC 24V	DC 48V
		Current	1.58 A	0.79 A	0.39 A
		Resistance	7.6 Ω	30.3 Ω	121.0 Ω
	Chopper f=1msec 50%ED	Current	2.5 A [5.0 A]	1.25 A [2.5 A]	0.63 A [1.25A]
		Resistance	2.4 Ω	9.6 Ω	38.4 Ω
		Power consumption	15W (for chopper control) [60W (for continuous conduction)]		
Insulation class		B class			
Min. pickup voltage		70% or below of rated voltage (hot coil)			
Release voltage		5% ~ 30% of rated voltage			
Insulation resistance		5MΩ or above (DC500V megger)			
Withstand voltage		AC 1500V 50 / 60 Hz One minute			
Ambient temperature		-20°C ~ +60°C (no condensation)			
Relative humidity		45% ~ 85% RH			
Vibration resistance (X, Y, Z directions)		6G in excited state		5G in non-excited state	
Shock resistance (X, Y, Z directions)		8G in excited state		4G in non-excited state	
Mechanical life		5 million times			
Electrical life		500,000 times (when used under condition of ※1)			
Weight		0.75 kg			

- NOTES**
- The making and breaking current capacities apply to contact A of all models, and the electrical life to contact A for load switching.
 - Beware that contact B is capable of conducting only and not breaking.
 - The current and resistance values of the coil represent those at an ambient temperature of +20°C, and the tolerance on them is ±10%.
 - The minimum pickup voltage represents that at an ambient temperature of +60°C and hot coil start.

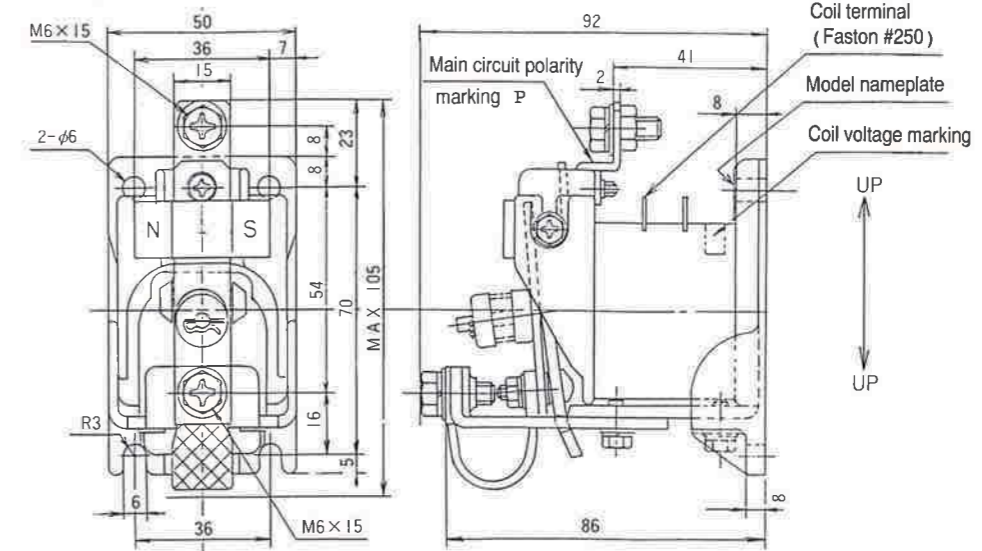
Relationship between Current, Max. ON Time and Duty Cycle



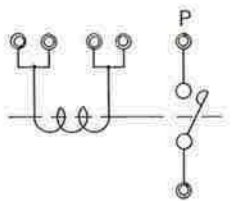
Duty cycle	5% ED	10% ED	25% ED	50% ED	75% ED	100% ED
Current	400 A	240 A	170 A	140 A	110 A	80 A
Max. ON time	30 sec	60 sec	140 sec	360 sec	600 sec	Continuous
OFF time	570 sec	540 sec	420 sec	360 sec	200 sec	-

Overall Dimensions

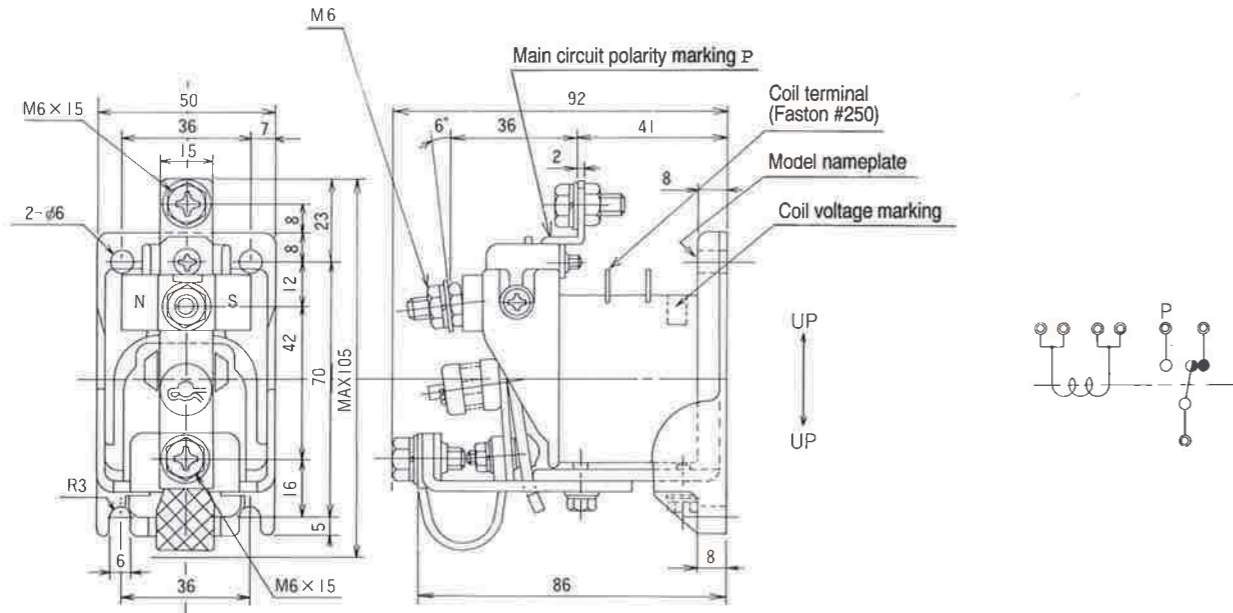
CM8S-A, AC



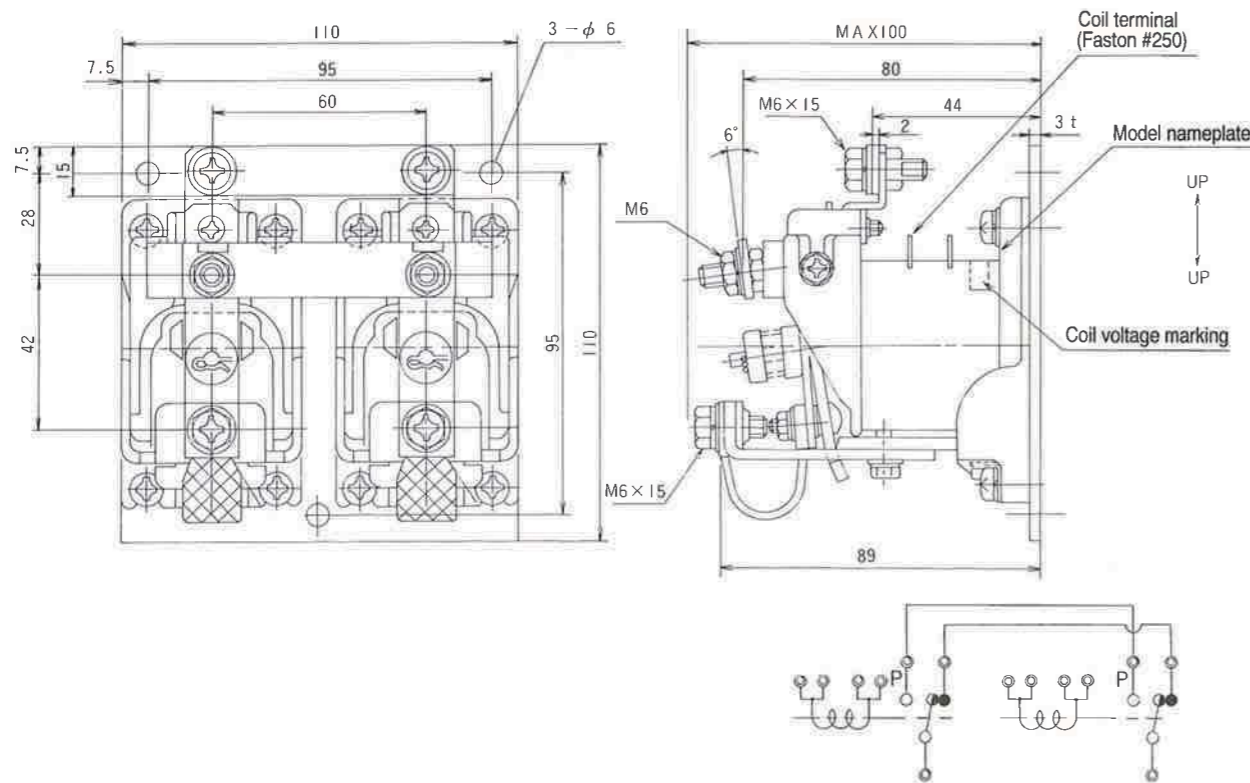
Contact Arrangement



CM8S-T, TC



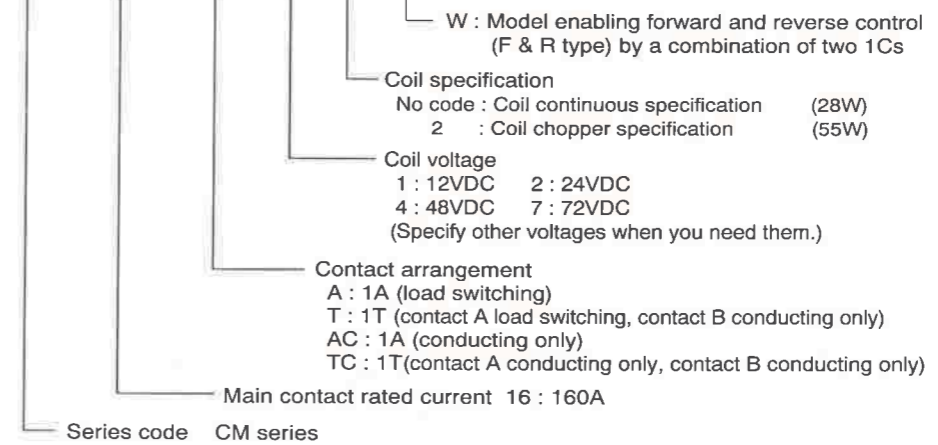
CM8S-TW, TCW, TC□3W, T□10W



- NOTES**
1. Use 46 to 55 kg·cm as the tightening torque of the main circuit terminal (M6).
 2. Connect the positive pole (+) to the terminal marked with the main circuit polarity marking P. (The contactor structure is such that arc is led out front by a built-in magnet.)
 3. Install the DC contactor with the UP side up.
 4. Provide a space of 5 mm or more between contactors when two or more contactors are to be installed side by side.

Model Designation

CM 16 — TC □ 2 W

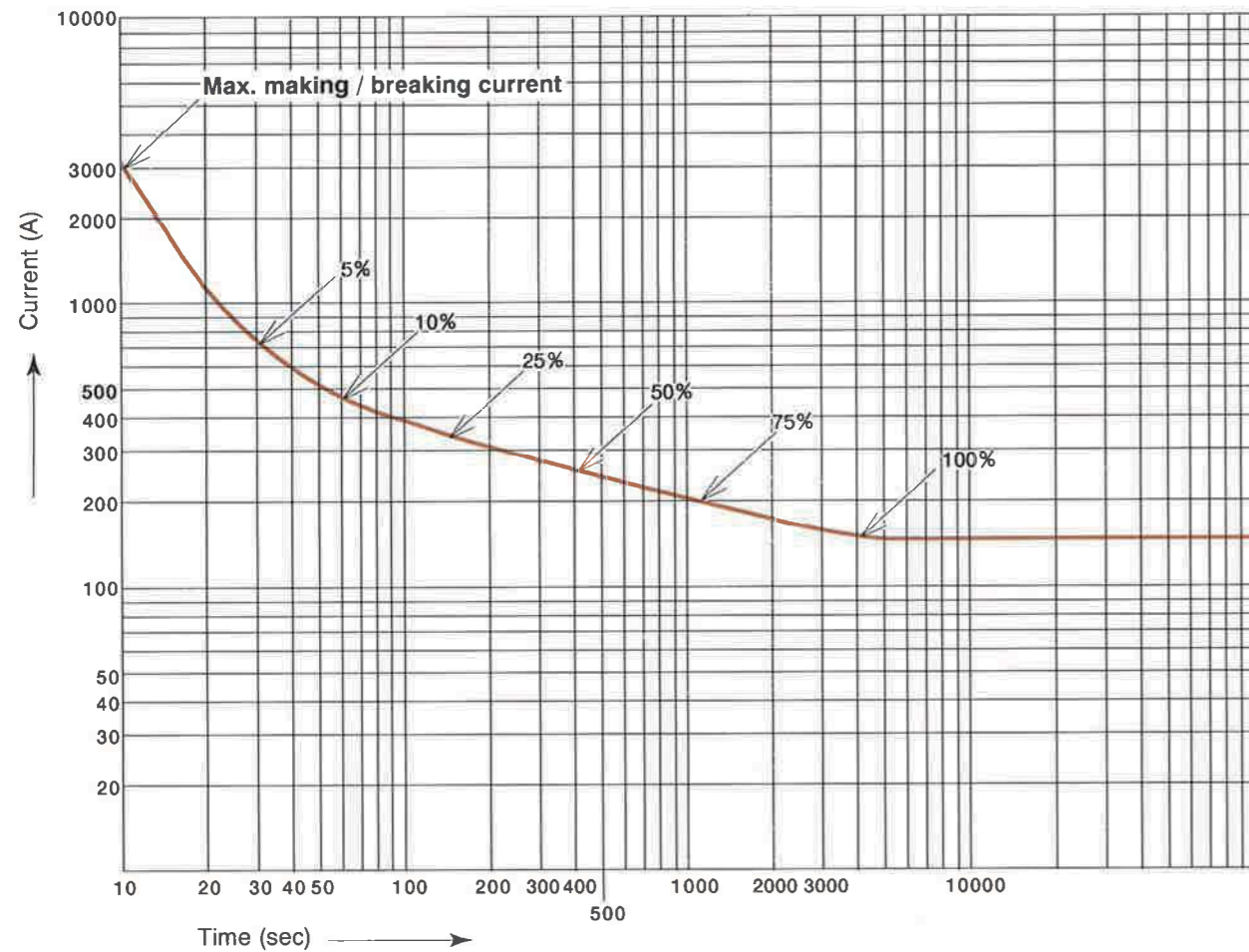


Performance

Main contact rated voltage		DC 72V				
Main contact rated current		160A continuous				
Main contact arrangement		1A		1T		
Main contact capacity	Condition	Making	Breaking	Time constant	No. of times	
	Make & break capacity	1950 A	1985 A	L / R=15 ms	125 times	
	Rated operating current ※1	650 A	160 A	L / R=10ms	500,000 times	
Switching frequency		1200 times / hour				
Coil	Continuous 8H	Voltage	DC 12V	DC 24V	DC 48V	DC 72V
		Current	2.28 A	1.16 A	0.58 A	0.39 A
		Resistance	5.27Ω	20.3Ω	81.0Ω	181Ω
	Chopper f=1msec 50%ED	Power consumption	28 W			
		Current	2.26 A [4.53 A]	1.13 A [2.26 A]	0.56 A [1.13A]	0.38 A [0.76A]
		Resistance	2.65Ω	10.6Ω	42.6Ω	94.8Ω
Power consumption		13.5W (for chopper control) [55W (for continuous conduction)]				
Insulation class		B class				
Min. pickup voltage		70% or below of rated voltage (hot coil)				
Release voltage		5% ~ 30% of rated voltage				
Insulation resistance		5MΩ or above (DC500V megger)				
Withstand voltage		AC 1500V 50 / 60 Hz One minute				
Ambient temperature		-20°C ~ + 60°C (no condensation)				
Relative humidity		45% ~ 85% RH				
Vibration resistance (X, Y, Z directions)		6G in excited state		4G in non-excited state		
Shock resistance (X, Y, Z directions)		10G in excited state		5G in non-excited state		
Mechanical life		5 million times				
Electrical life		500,000 times (when used under condition of ※ 1)				
Weight		Coil continuous specification 1.2Kg, Coil chopper specification 0.9Kg				

- NOTES**
1. The making and breaking current capacities apply to contact A of all models, and the electrical life to contact A for load switching.
 2. Beware that contact B is capable of conducting only and not breaking.
 3. The current and resistance values of the coil represent those at an ambient temperature of +20°C, and the tolerance on them is ±10%.
 4. The minimum pickup voltage represents that at an ambient temperature of +60°C and hot coil start.

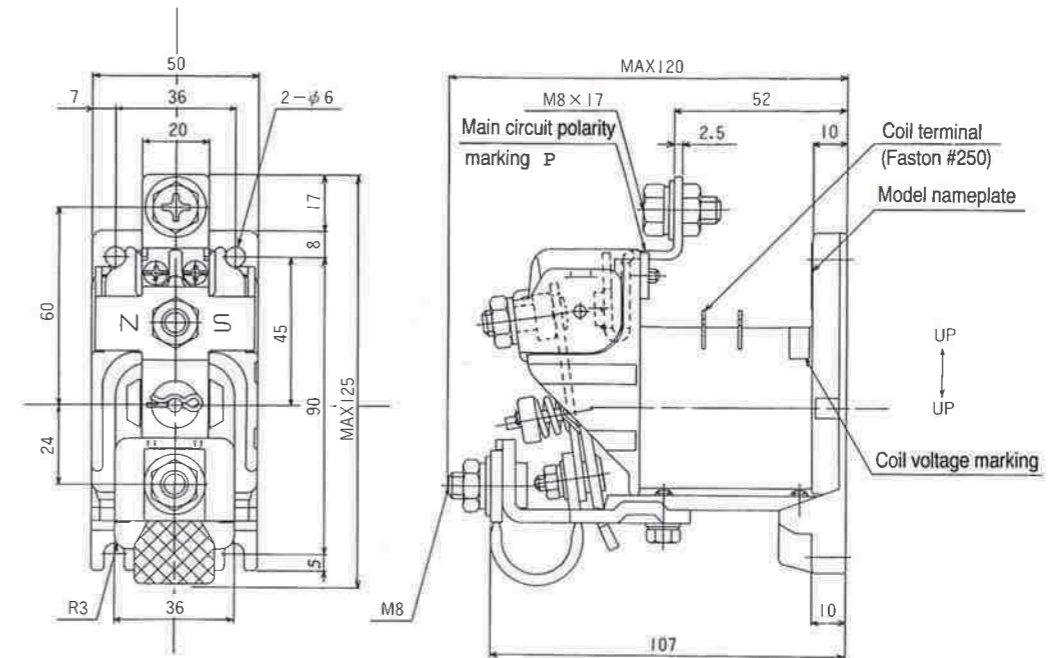
Relationship between Current, Max. ON Time and Duty Cycle



Duty cycle	5% ED	10% ED	25% ED	50% ED	75% ED	100% ED
Current	700 A	450 A	350 A	270 A	200 A	160 A
Max. ON time	30 sec	60 sec	160 sec	420 sec	1020 sec	Continuous
OFF time	570 sec	540 sec	480 sec	420 sec	340 sec	-

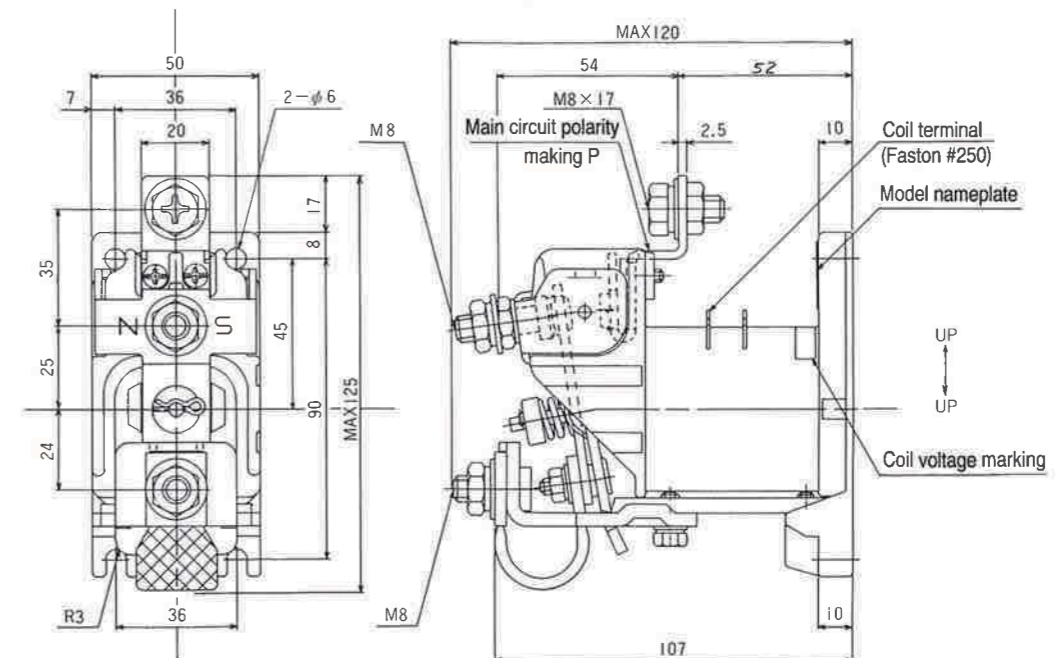
Overall Dimensions

CM16-A, AC

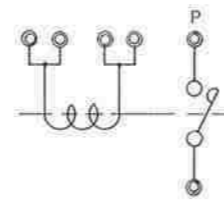
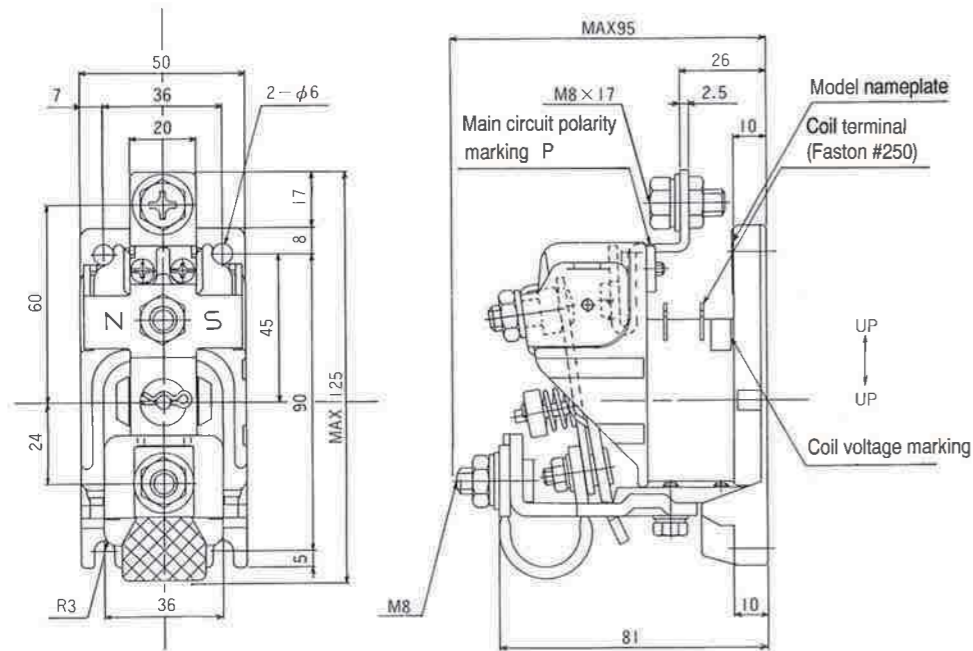


Contact Arrangement

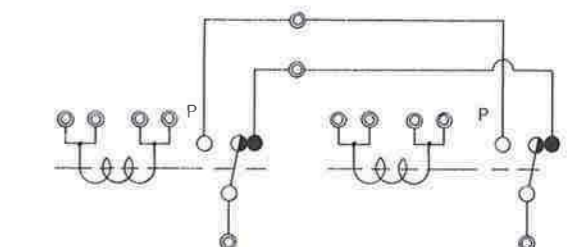
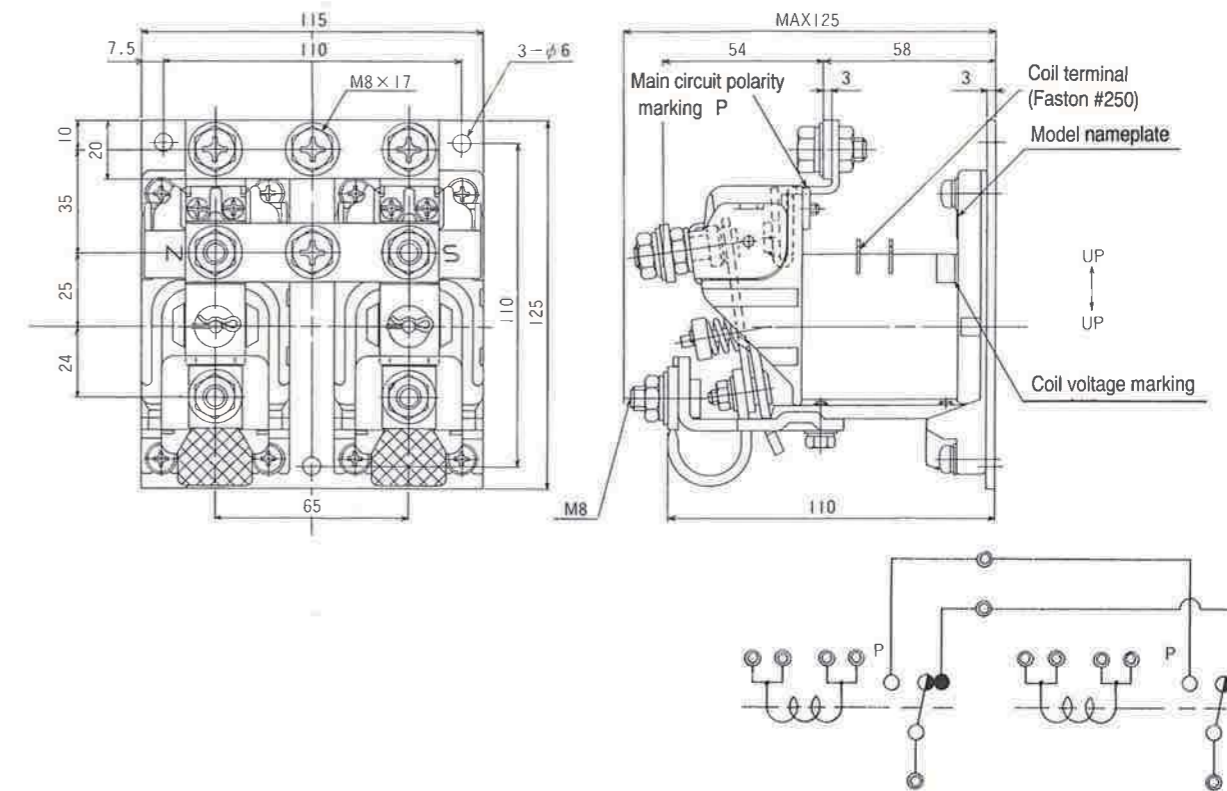
CM16-T, TC



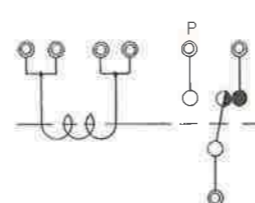
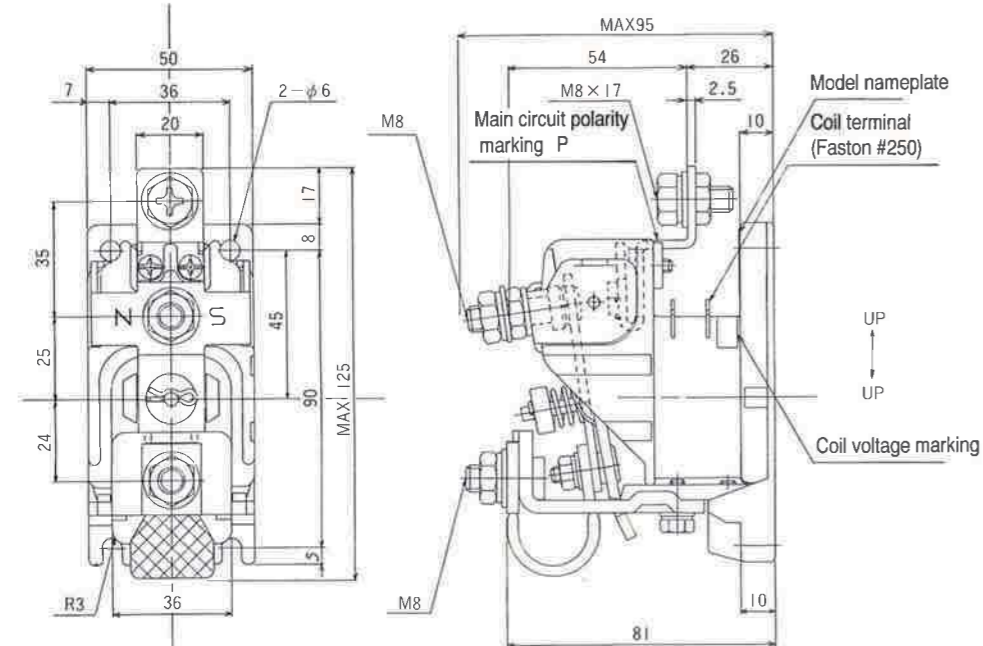
CM16-A□2, AC□2



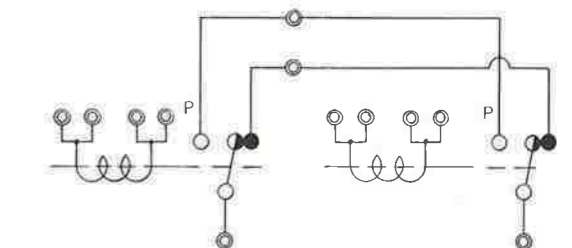
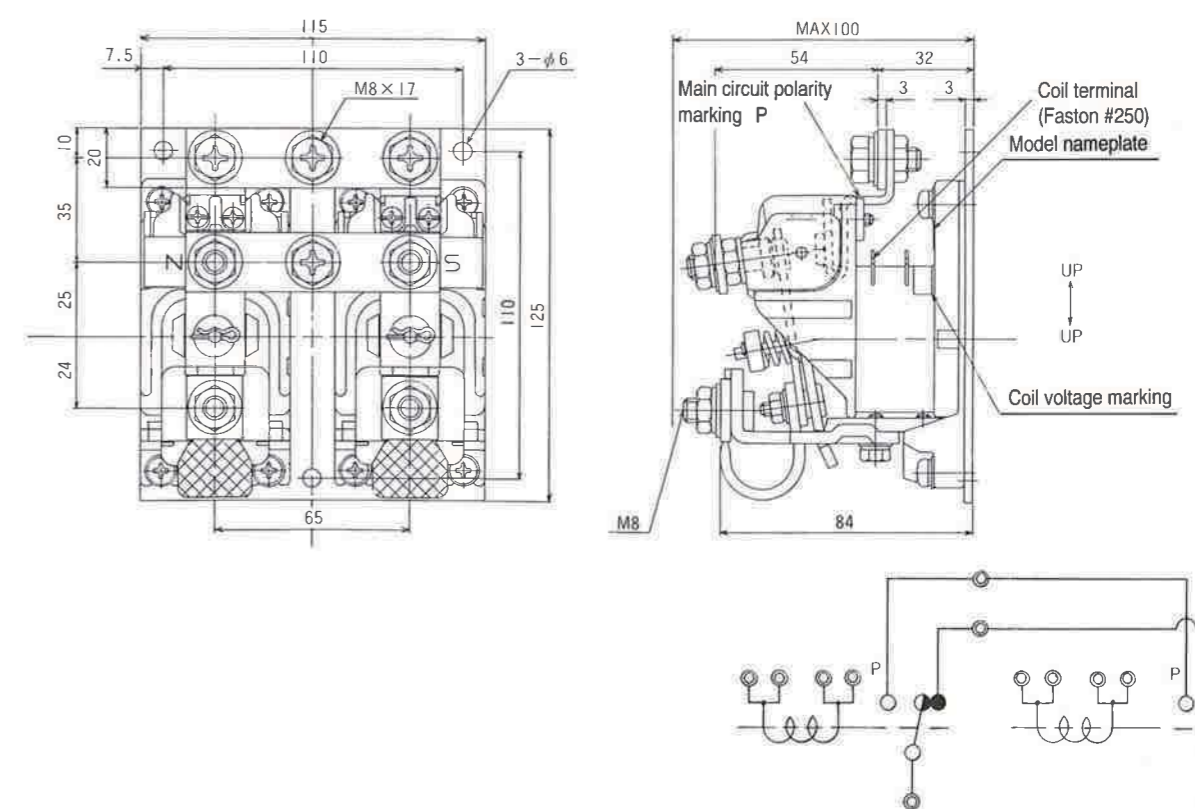
CM16-T□W, TC□W



CM16-T□2, TC□2



CM16-T□2W, TC□2W



- NOTES**
1. Use 90 to 110 kg · cm as the tightening torque of the main circuit terminal (M8).
 2. Connect the positive pole (+) to the terminal marked with the main circuit polarity marking P. (The contactor structure is such that arc is led out front by built-in magnet.)
 3. Install the DC contactor with the UP side up.
 4. Provide a space of 10 mm or more between contactors when two or more contactors are to be installed side by side.