

Magnetic Contactors & Thermal Overload Relays

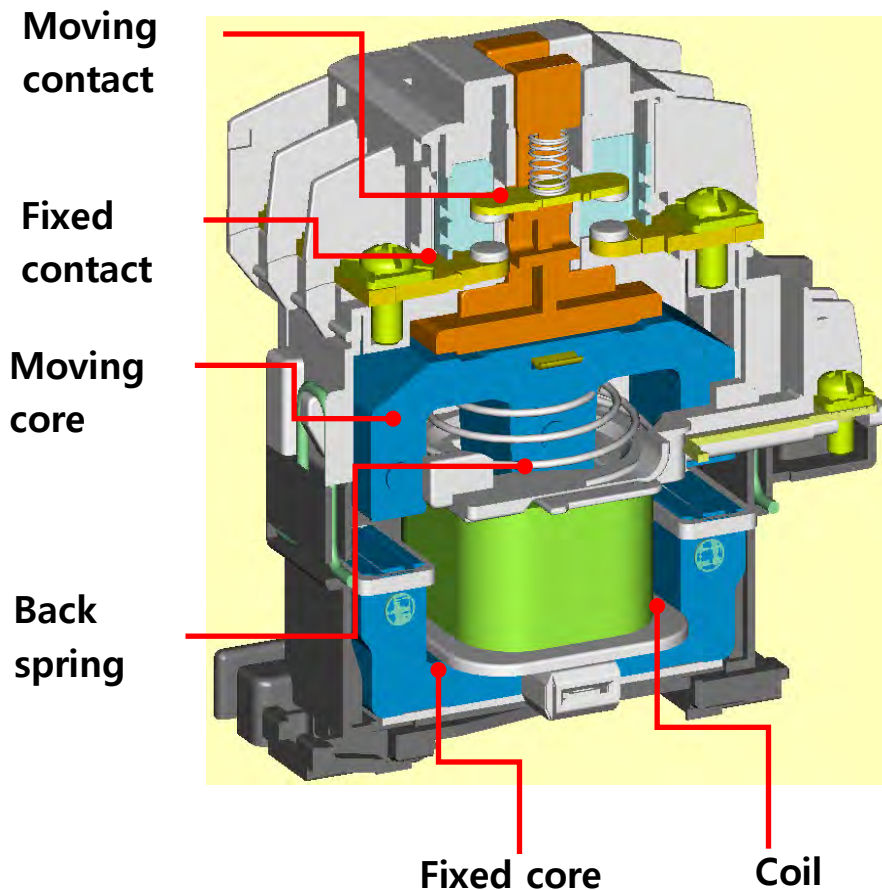
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- 2] Structure**
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Structure of Magnetic Contactor

Contactor is operate by an electromagnetic force which is generate from the iron core while coil energizing



1. Moving core goes down towards the fixed core while the coil energizing

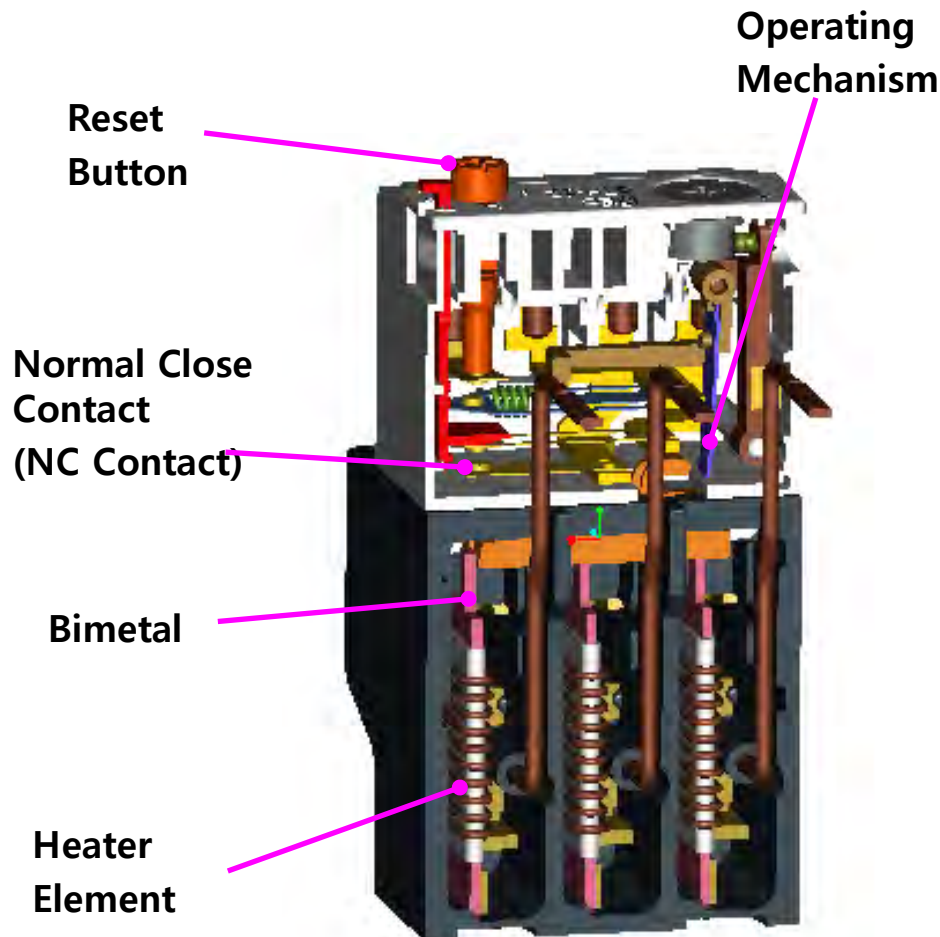
2. Moving contact ; which is connected to moving core ; goes down towards the fixed core. And this is ON status

3. When the coil de-energize, moving core separate from fixed core by a force of back spring

4. Moving contact separate from the fixed contact. And this is OFF status

Structure of Thermal Overload Relay

TOR is operate by a bimetal which has a bending characteristic corresponding temperature rise. Finally it prevents a damage and a loss of motor



1. Heater generates a temperature rise due to an over current which is cause from overload or phase loss condition of motor
2. The Bimetal bends under surrounding temperature variations and finally it rotates the operating mechanism . At the same time, b contact changes to a contact
3. Contactor's coil can be de-energized through the a contact of TOR and finally prevents a damage of motor by stop operating
4. Pressing reset button enables aux. contact to return to the original status. And this makes ON operation of contactor

1] Performance

Magnetic Switches

1] Performance

2] Structure

3] Numbering system

4] Range & Frame

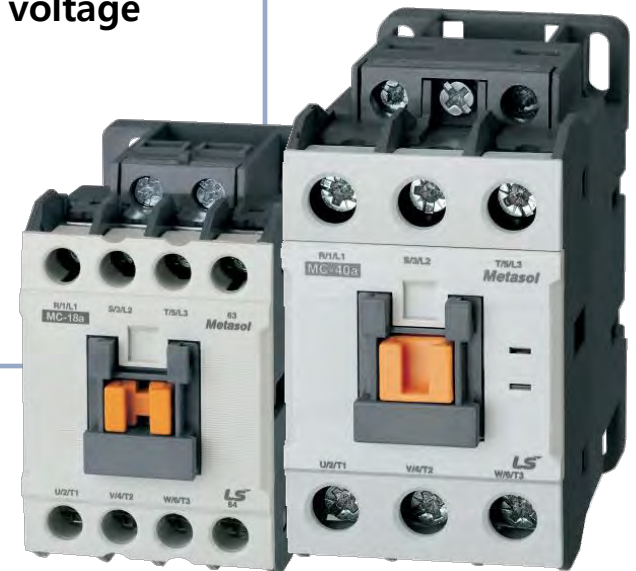
5] Specification

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- Compact size & Easy connection
- Improved Arc Protection from sealed structure
- Upgrade Rated Insulation voltage (690V->1000V over 40AF)
- Upgrade Impulse withstand voltage (6kV->8kV over 40AF)
- Upgrade Low current reliability at Low voltage (DC24V 10mA-> DC17V 5mA)
- Direct MMS Mounting
 - Screw Type:~40AF & will be expanded up to 100AF
- Satisfied with Type 2 coordination



2] Structure

Magnetic Switches

Magnetic

1] Performance

2] **Structure**

3] Numbering system

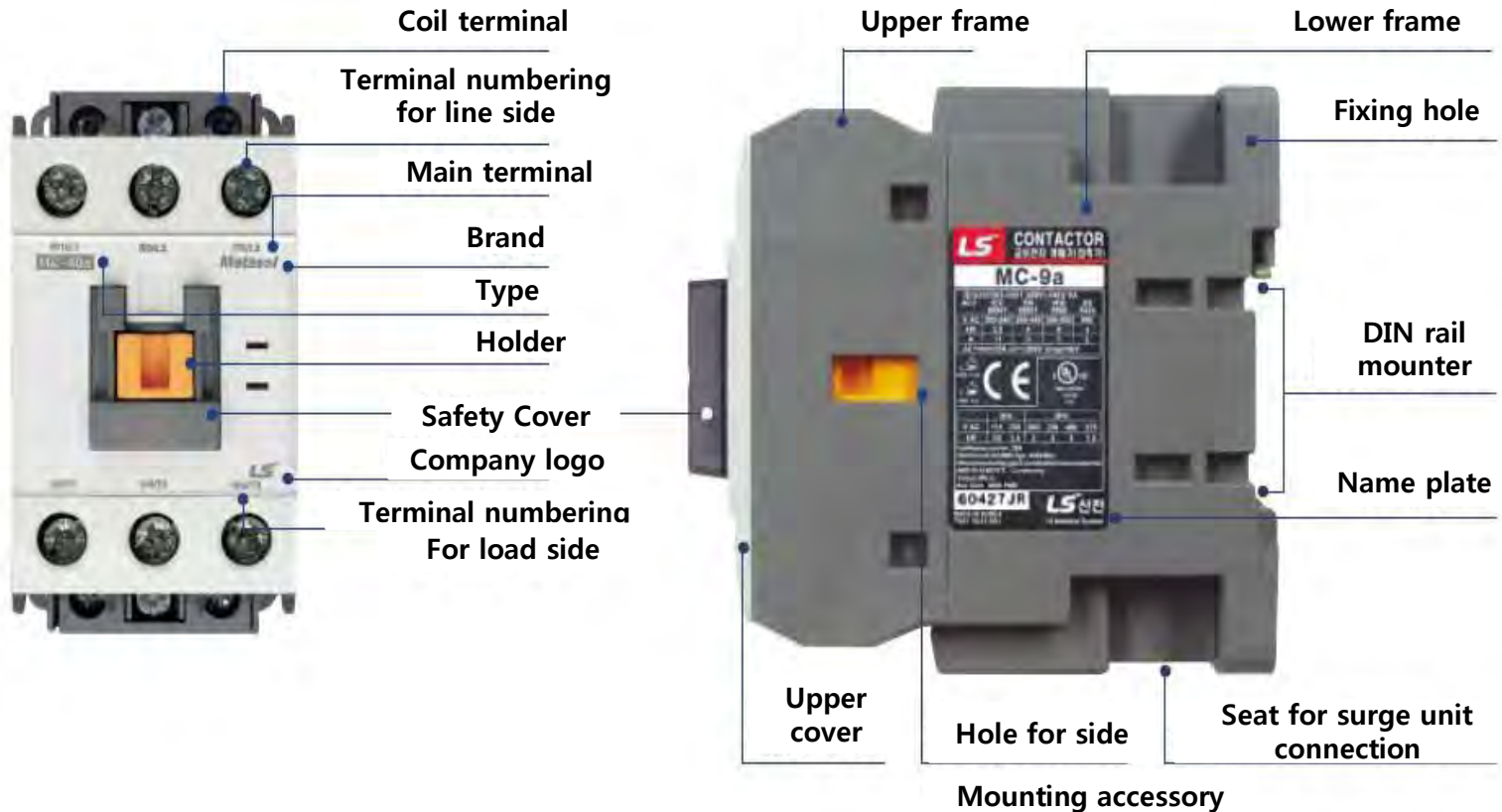
4] Range & Frame

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2] Structure

Magnetic Switches

Thermal Overload Relays

1] Performance

2] Structure

3] Numbering system

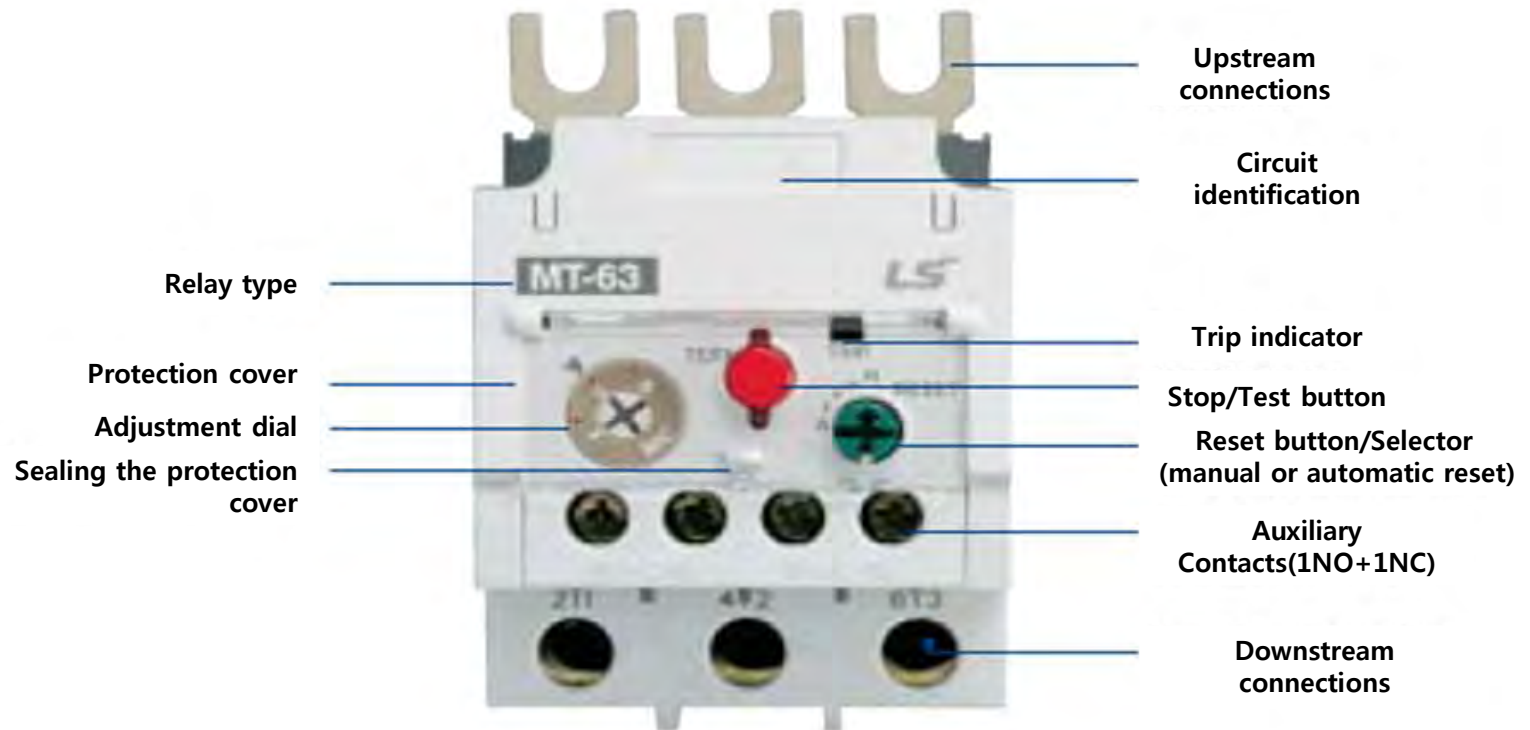
4] Range & Frame

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3] Numbering System

Magnetic Switches

Catalog Numbering System

Contactors

MC-6a	/	R	/	AC220		60Hz		1a1b
Rated current		Version		Coil voltage		Frequency		Auxiliary contact
6a 6A		- Standard		AC 220 AC 220V		60 60Hz		00 None
⋮		R Reversing		⋮		50 50Hz		11 1a1b
800a 800A				DC 24 DC 24V				22 2a2b
				Note) See page 18, 19 for details.				10 1a(1NO)
								01 1b(1NC)

NEW
2100AF

Thermal Overload Relay

MT-12	/	2H		0.1
Frame size		Relay version		Relay setting current
12 12AF		2H Non-differential (2-heater)		0.1 0.1A
32 32AF				⋮
63 63AF		3H Non-differential (3-heater)		⋮
95 95AF		3K Differential		800 800A
⋮		3D Class 20		
800 800AF				

3] Numbering System

Magnetic Switches

Catalog Numbering

- 1] Performance
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Auxiliary contact unit

UA1		11	
Version		Contact composition	
UA-1	Side mount	11	1NO+1NC
AU-100		20	2NO
AU-100E		02	2NC
UA-2	Front mount(2P)	40	4NO
UA-4	Front mount(4P)	31	3NO+1NC
		22	2NO+2NC
		13	1NO+3NC
		04	4NC

Surge absorber

US11		
Composition and voltage		
1	Varistor+RC	AC/DC 24~48V
2	Varistor+RC	AC/DC 100~125V
3	Varistor+RC	AC/DC 200~240V
4	Varistor+RC	AC 380~440V
5	Varistor+RC	AC 24~48V
6	Varistor+RC	AC 100~125V
11	Varistor	AC 200~240V
12	Varistor	DC 24~48V
13	Varistor	DC 100~125V
14	Varistor	DC 200~220V
22	RC	AC 100~125V

Interlock unit

UR02	
Contact composition	
02	2NC
00	None

Wire kit for Interlocking

UW32	
Frame size	
18	18AF
22	22AF
32	32AF
63	63AF
95	95AF

Interlock set (UR+UW)

RK32	
Frame size	
32	32AF
63	63AF
95	95AF

Separate mounting unit (For relay)

UZ32	
Frame size	
32	32AF
63	63AF
95	95AF
150	150AF

Remote reset unit (For relay)

UM	
Cable length	
4R	400
5R	500
6R	600

4] Range & Frame

Magnetic Switches

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4] Range & Frame

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	18AF	22AF	40AF	65AF	100AF
Contactor	MC-6a, 9a, 12a, 18a	MC-9b, 12b, 18b, 22b	MC-32a, 40a	MC-50a, 65a	MC-75a, 85a, 100a
Rated current	6, 9, 12, 18A	9, 12, 18, 22A	32, 40A	50, 65A	75, 85,100A
Rated insulation voltage	690V		1000V		
Type II	150kA@ 415V Max.				
Overload relay	MT-12	MT-32	MT-32	MT-63	MT-95
Current range	0.1~18A	0.1~40A	0.1~40A	4~65A	7~100A
Trip class	Class 10A,20				
Outline view					

4] Range & Frame

Magnetic Switches

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	150AF	225AF	400AF	800AF
Contactor	MC-130a, 150a	MC-185a, 225a	MC-265a,330a,400a	MC-500a, 630a, 800a
Rated current	130, 150A	185, 225A	265, 330, 400A	500, 630, 800A
Rated insulation voltage	1000V			
Type II	150kA@ 415V Max.			
Overload relay	MT-150	MT-225	MT-400	MT-800
Current range	34~150A	65~240A	85~400A	200~800A
Trip class	Class 10A,20			
Outline view				

4] Range & Frame

Magnetic Switches

Magnetic Contactors

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Metasol Series			
AF	Type	Size(W x H x D)	TOR,MMS
18AF	MC-6a	a : 45×74.5×80.6	MT-12 MMS-32
	MC-9a		
	MC-12a		
	MC-18a		
22AF	MC-9b, 12b, 18b, 22b	b : 45×74.5×86	MT-32 MMS-32
40AF	MC-32a	45×83×93	
	MC-40a		
65AF	MC-50a	55×106×122	MT-63 MMS-63
	MC-65a		
100AF	MC-75a	70×140×137	MT-95 MMS-100
	MC-85a		
	MC-100a		

4] Range & Frame

Magnetic Switches

Thermal Overload

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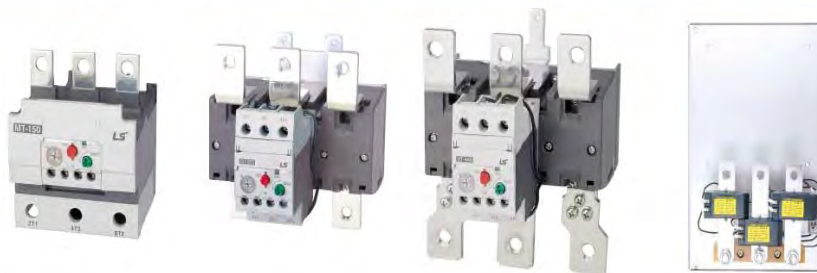
7] Accessories

8] Certificates

MT-12	MT-32	MT-63	MT-95
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MT-150	MT-225	MT-400	MT-800
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Overload relay		Contactor
Type	Setting range	Type
MT - 12	0.1~18A	MC-6a
		MC-9a
		MC-12a
		MC-18a
MT - 32	0.1~40A	MC-9b
		MC-12b
		MC-18b
		MC-22b
		MC-32a
MT - 63	4~65A	MC-40a
		MC-50a
MT - 95	7~100A	MC-65a
		MC-75a
		MC-85a
MT - 150	34~150A	MC-100a
		MC-130a
MT - 225	65~240A	MC-150a
		MC-185a
MT - 400	85~400A	MC-225a
		MC-265a
		MC-330a
MT - 800	200~800A	MC-400a
		MC-500a
		MC-630a
		MC-800a

5] Specification

Magnetic Switches

Low Ampere Frame

- 1] Performance
- 2] Structure
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- 4] Range & Frame
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- 8] Certificates

Ampere Frame	18AF	22AF	40AF	65AF	100AF
Model	MC-6a	MC-9b	MC-32a	MC-50a	MC-75a
	MC-9a	MC-12b	MC-40a	MC-65a	MC-85a
	MC-12a	MC-18b			MC-100a
	MC-18a	MC-22b			
Auxiliary (standard)	1a or 1b	1a1b	2a2b		
Rated insulation voltage, Ui	690v	690v	1000v		
Rated operational Voltage, Ue	690v				
Number of poles	3 Pole (4 pole)				
Terminal Type	Screw				
Electric Durability	2.5 mil. operations			2 mil. operations	
Rated impulse withstand voltage, Uimp	6kV		8kV		

5] Specification

Magnetic Switches

High Ampere

1] Performance

2] Structure

3] Numbering system

4] Range & Frame

5] Specification

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Frame			150AF		400AF	800AF
			MC-130a	MC-150a	MC-265a	MC-500a
Wire connection			Screw	Screw	Screw	Screw
Number of poles			3 Pole / 4 pole			
Rated operational voltage (Ue)			Up to 1000V	Up to 1000V	Up to 1000V	Up to 1000V
Rated frequency			50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Rated insulation voltage (Ui)			1000V	1000V	1000V	1000V
Rated impulse voltage (Uimp)			8kV	8kV	8kV	8kV
Degree of protection (IEC 60 529)			IP 20	IP 20	IP 20	IP 20
Mechanical endurance (Cycles)			5,000,000	5,000,000	5,000,000	5,000,000
Electrical endurance for Ie/AC3 (Cycles)			1,000,000	1,000,000	1,000,000	500,000
Max operating frequency per hour (Ope./h)			1200	1200	1200	1200
Wire size (Solid, stranded)		AWG	3-4/0	3-4/0	350-700	1700-Busbar
Conventional free air thermal current (Ith,AC1)			160	210	300	580
Rated operational power / current / Ie (AC3)	220/240V	kW	37	45	75	147
		A	130	150	265	500
	380/440V	kW	60	75	132	250
		A	130	150	265	500
	500/550V	kW	60	90	140	295
		A	90	140	265	500
Rated operational power / current / Ie (AC4)	220/240V	kW	22	30	-	-
		A	93	125	-	-
	380/440V	kW	45	55	102	176
		A	90	110	164	300

6] Features

Magnetic Switches

Auxiliary

1] Performance

2] Structure

3] Numbering system






























4] Range & Frame

5] Specification

6] Features

7] Accessories

8] Certificates

AF	Schneider	Siemens	ABB	GE	AB	KM	Fuji (SC-E)	Cutler Hammer	LS (Metasol)
12AF	 1a1b			 1a or 1b	 1a or 1b	 Option		 Option	18AF 1a or 1b
32AF	 1a1b	Option	Option	 Option	 Option	 Option	Option	 Option	22AF (1a1b)
50AF	 1a1b	 Option	 Option	 Option	 Option	 Option	 Option	 Option	Option
95AF	 1a1b	 Option	 Option	 Option	 Option	 Option	 None	 Option	Option

6] Features

Magnetic Switches



- ✚ Easy way to make a reversing contactor combination
- ✚ No need an additional auxiliary contact for electrical interlock

1] Performance

2] Structure

3] Numbering system

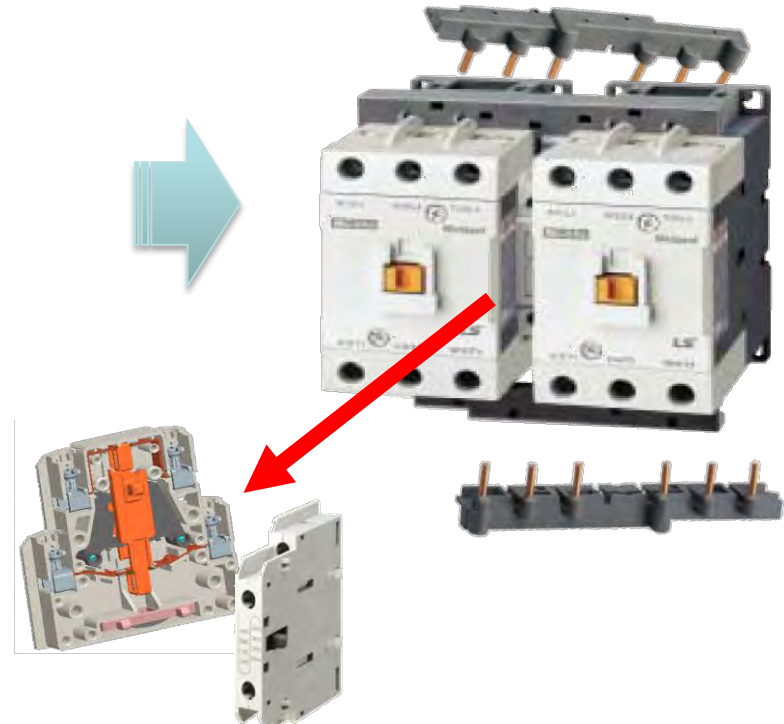
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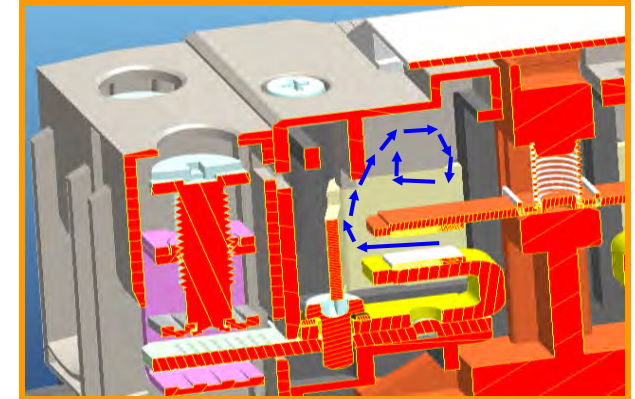
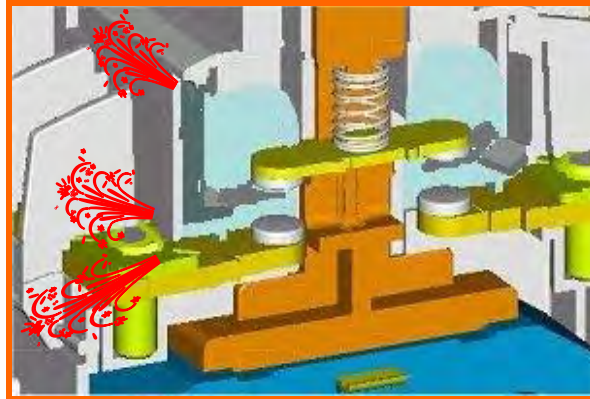


6] Features

Magnetic Switches

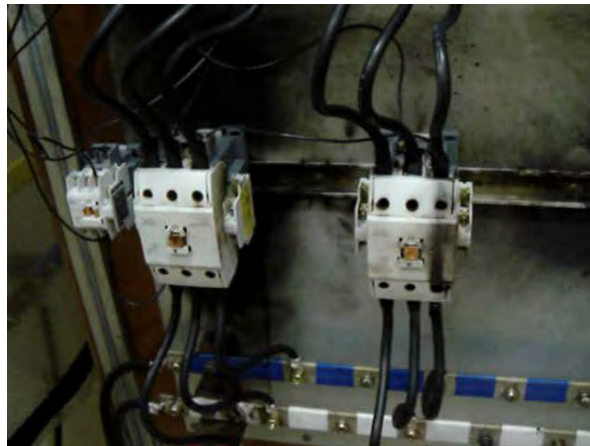
■ Safety

☞ No arc exposure from the sealed structure

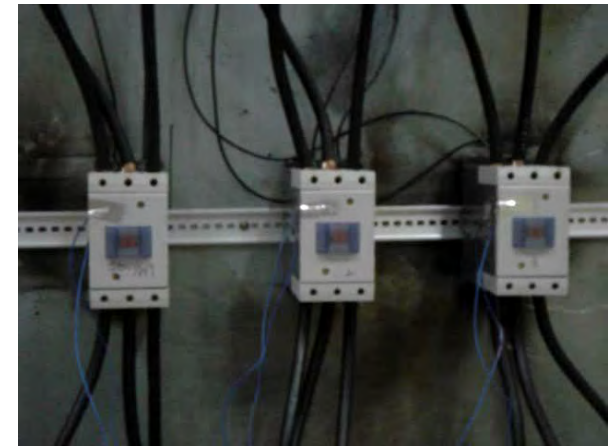


☞ Continued Safety

Meta-MEC series



Metasol series



6] Features

Magnetic Switches

Safety

Meta-MEC

Metasol

Rated
insulation
voltage,
 U_i



Rated
impulse
withstand
voltage,
 U_{imp}



Comparison

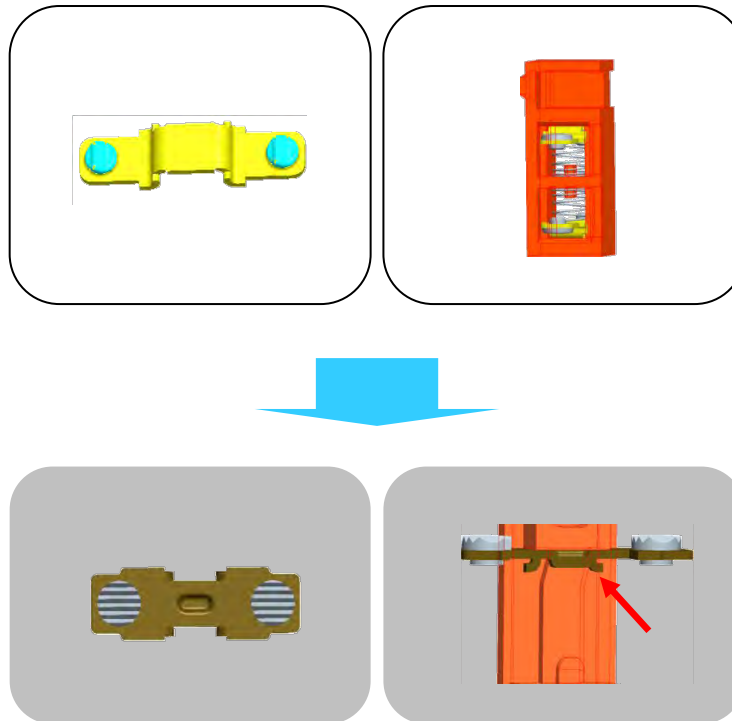
Type	Range	Schneider	Siemens	Moeller	AB	C/H	LS Metasol
U_i (1000V)	32A	X	X	X	X	X	1000V
	50A	1000V	X	X	X	X	1000V
	85A	1000V	1000V	1000V	X	X	1000V
U_{imp}	32A	6KV	6kV	6kV	6kV	6kV	8KV
	50A	8KV	6kV	6kV	6kV	6kV	8KV
	85A	8KV	6kV	6kV	6kV	6kV	8KV

6] Features

Magnetic Switches

Conduct

 To ensure that the auxiliary contact remain conductive



Suitable
for

Electronic circuits
(Programmable
Controllers)
with voltage
more than **DC17V**
And current **5mA**

6] Features

Magnetic Switches

Compact solution

To make a compact panel in a flash

1] Performance

2] Structure

3] Numbering system

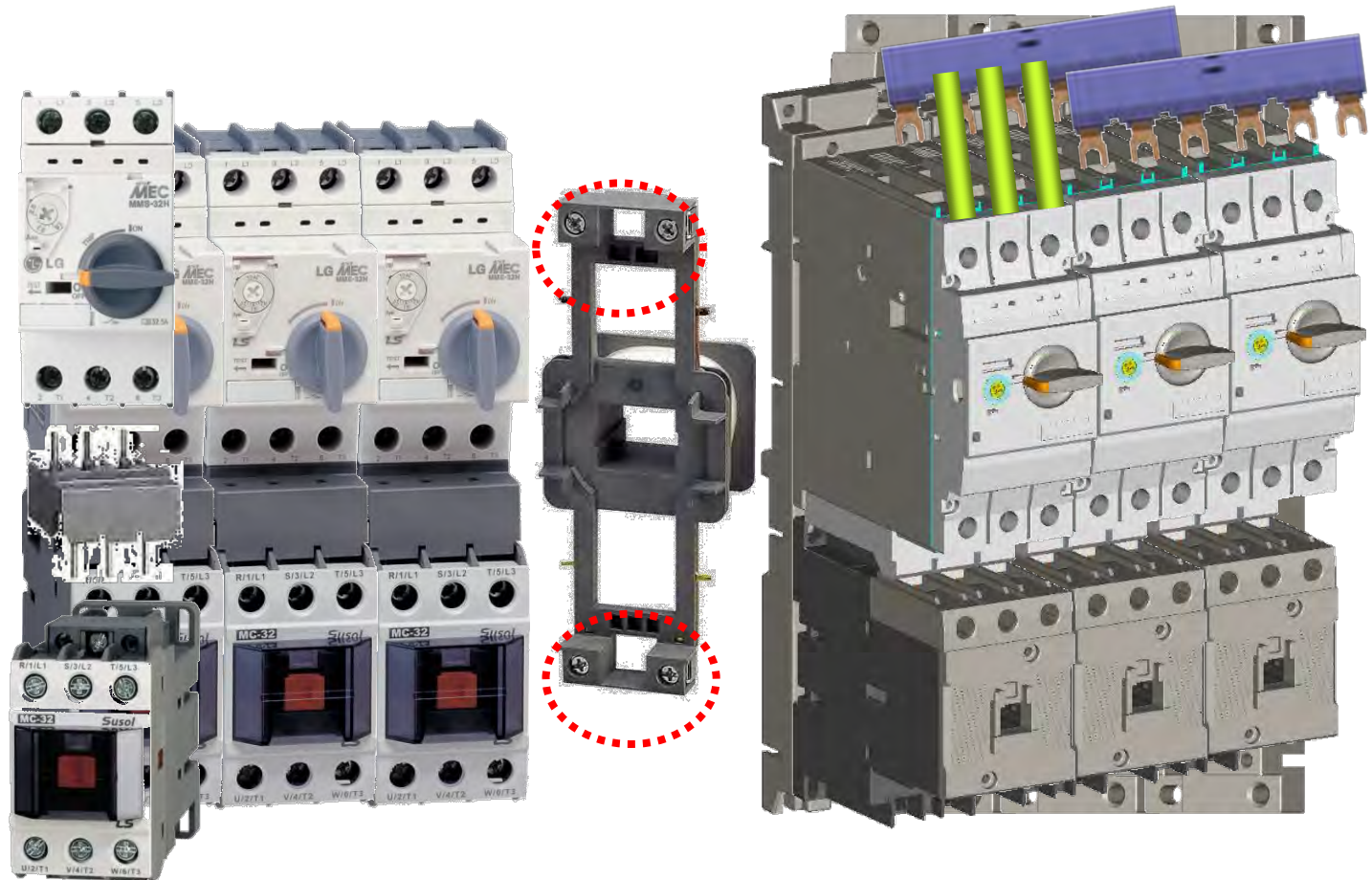
4] Range & Frame

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6] Features

Magnetic Switches

🚩 Type 2 Coordination

🚩 To make a compact panel in a flash

- 🚩 Type 1 coordination
 - Protection for personnel
- 🚩 Type 2 coordination
 - Protection for personnel and equipment
- 🚩 Reduce maintenance costs
 - repair time
 - equipment replacement costs

🚩 Type 2



6] Features

Magnetic Switches

Type 2 Coordination

Application example in Building Sector

■ Air conditioning

Type 1 coordination

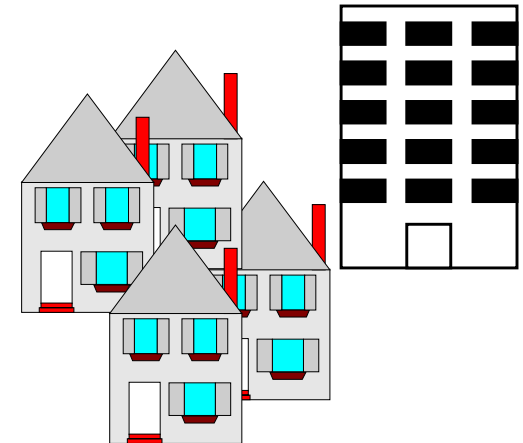
Standard starter

■ Lifts / Escalators

Type 2 coordination

■ Toxic fume extractor fan

High performance starter



1] Performance

2] Structure

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6] Features

Magnetic Switches

■ Type 2 Coordination

Application example in industrial Sector

1] Performance

2] Structure

3] Numbering system

4] Range & Frame

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■ Packing line

Type 1 coordination

Standard starter

■ Bottling line

Type 2 coordination

■ Petrochemical process

High performance starter



7] Accessories

Magnetic Switches

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7] **Accessories**

8] Certificates



Auxiliary contact



Surge unit



Capacitor unit



Interlock wire unit



Mechanical wire kit



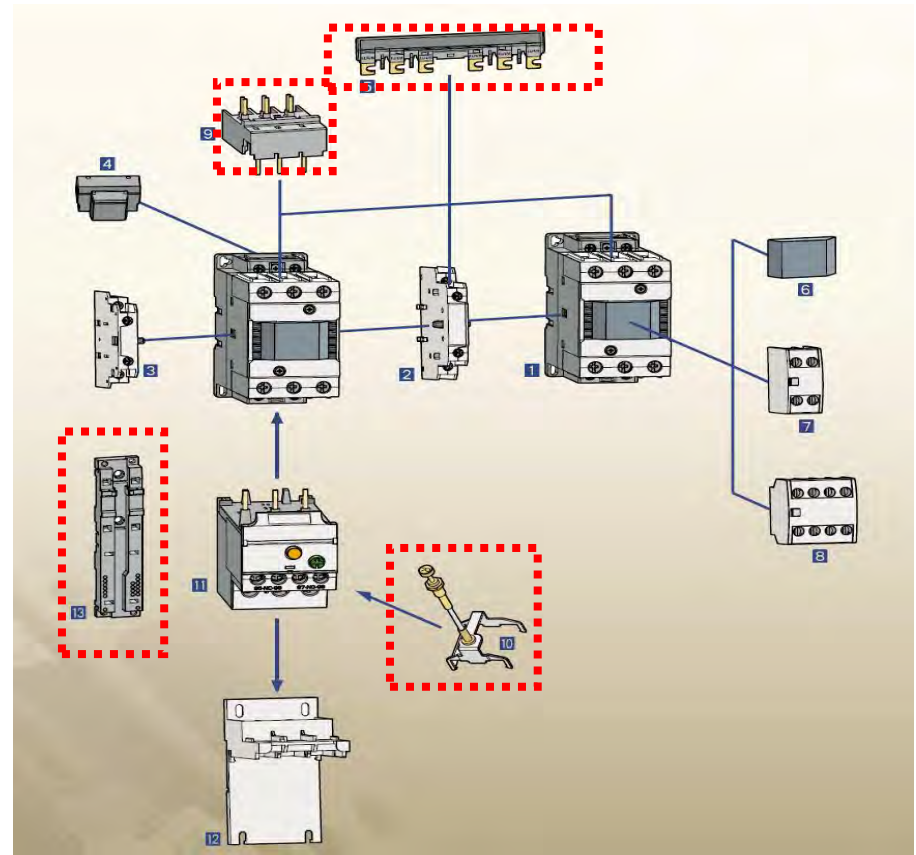
Remote reset unit



Director adaptor



Mounting unit



7] Accessories

Magnetic Switches

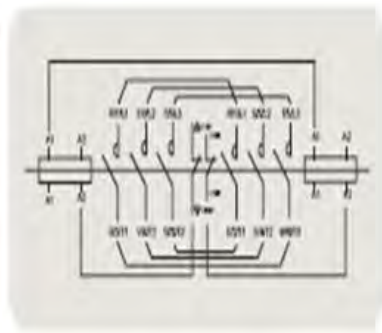
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Reversing

- Reversing MC is a combination of two standard MCs with a mechanical interlock unit.
- Applications are for forwarding, reversing, reverse phase breaking, constant, instant and transfer operation motor.

Description

- Two AC or DC control contactors are interlocked mechanically and electrically
- 3-pole(NO) main contact in each contactor
- Finger proof design
- Front/side mountable accessories available
- Overload relay can be directly mounted to the contactor if necessary



7] Accessories

Magnetic Switches

Reversing MC

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Type	AC-3 duty (KW)						Current	Weight (AC control)
	200~240V	380~400V	415V	440V	500V	690V	440V (A)	
MC-6a/R	2.2	3	3	3	3	3	7	0.63kg
MC-9a/R	2.5	4	4	4	4	4	9	0.63kg
MC-12a/R	3.5	5.5	5.5	5.5	7.5	7.5	12	0.63kg
MC-18a/R	4.5	7.5	7.5	7.5	7.5	7.5	18	0.63kg
MC-9b/R	2.5	4	4	4	4	4	9	0.75kg
MC-12b/R	3.5	5.5	5.5	5.5	7.5	7.5	12	0.75kg
MC-18b/R	4.5	7.5	7.5	7.5	7.5	7.5	18	0.75kg
MC-22b/R	5.5	11	11	11	15	15	25	0.75kg
MC-32a/R	11	18.5	18.5	18.5	22	22	32	0.95kg
MC-40a/R	11	18.5	18.5	18.5	22	22	40	0.95kg
MC-50a/R	15	22	22	22	30	30	50	1.7kg
MC-65a/R	18.5	30	30	30	33	33	65	1.7kg

7] Accessories

Magnetic Switches

Reversing MC

Type	AC-3 duty (KW)						Current	Weight (AC control)
	200~240V	380~400V	415V	440V	500V	690V	440V (A)	
MC-75a/R	22	37	37	37	37	37	75	3.3kg
MC-85a/R	25	45	45	45	45	45	85	3.3kg
MC-100a/R	30	55	55	55	55	45	100	3.3kg
MC-130a/R	37	60	60	60	60	55	120	4.3kg
MC-150a/R	45	75	75	75	75	55	150	4.3kg
MC-185a/R	55	90	90	90	110	110	185	13kg
MC-225a/R	75	132	132	132	132	140	225	13kg
MC-265a/R	80	147	147	147	147	160	265	21.4kg
MC-330a/R	90	160	160	160	160	200	330	21.4kg
MC-400a/R	125	200	200	200	225	250	400	21.4kg
MC-500a/R	147	265	265	265	265	300	500	60kg
MC-630a/R	190	330	330	330	330	400	630	60kg
MC-800a/R	220	440	440	440	440	500	800	60kg

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7] Accessories

Magnetic Switches

Capacitor MC

- Capacitor is adjusted for switching single-step or multiple-step condenser bank.

Description

- Capacitor unit(Pre-loading register) is connected to the terminals of the contactor to reduce the high inrush current exceeding $20 \cdot I_n$.
- AC or DC control coil on selection
- 3-pole(NO) main contact
- Finger proof design
- DIN rail or screw mountable

Type	Maximum operating power (Kvar)			Rated Current (A)	Capacitor unit type
	220~240V	400~440V	600~550V		
MC-9a/9b(D)	5	9.7	14	14	AC-9
MC-12a/12b(D)	6.7	12.5	18	18	AC-9
MC-18a/18b(D)	8.5	16.7	24	24	AC-9
MC-22b(D)	10	18.	26	26	AC-9
MC-32a(D)	15	25	36	36	AC-9
MC-40a(D)	20	33.3	48	48	AC-9
MC-50a(D)	20	40	58	58	AC-50
MC-65a(D)	25	45.7	66	66	AC-50
MC-75a (D)	29.7	54	78	78	AC-50
MC-85a(D)	35	60	92	92	AC-50
MC-100a (D)	37	62	94	94	AC-50



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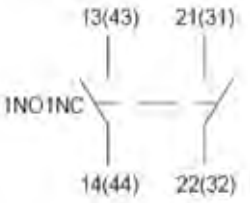

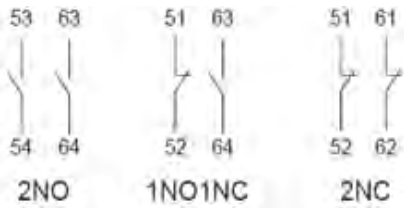

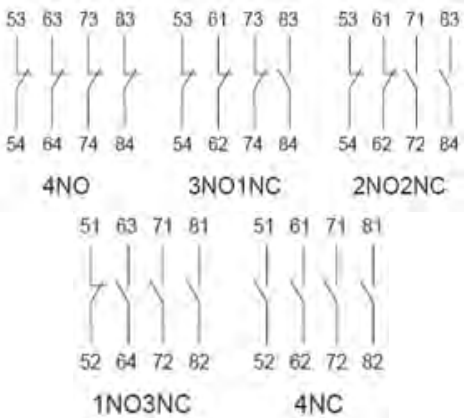
7] Accessories

Magnetic Switches

Auxiliary Contact

- Side or front mountable unit
- Common use for all Metasol contactors

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Type	Appearance	Pole	Composition		Contact Arrangement	Mount	Weight (g)
			NO	NC			
UA-1		2	1	1		Side	53
UA-2		2	2 1 -	- 1 2		Front	25
UA-4		4	4 3 2 1 -	- 1 2 3 4		Front	50

7] Accessories

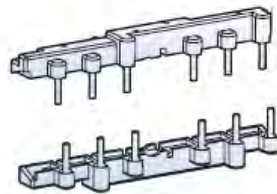
Magnetic Switches

Interlock & Wire

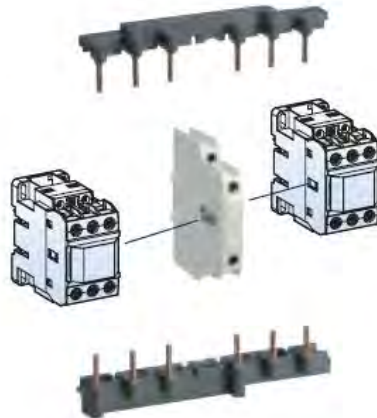
- 1] Performance
- 2] Structure
- 3] Numbering system
- 4] Range & Frame
- 5] Specification
- 6] Features
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- 8] Certificates



Interlock unit



Wire kit



Interlocks

Component parts for assembling by customer

Interlock unit, UR-02

UR-02 is a mechanical interlock unit and provides 2NC contacts for use in electrical interlocking

Wire kit UW

UW is used for making reversing circuit between two contactors

Contactor	Wire kit		Interlock unit	
	Type	Weight	Type	Weight
		g		g
MC-6a~22a	UW-18	50	UR-02	64
MC-9b~22b	UW-22	50		
MC-32a,40a	UW-32	45		
MC-50a, 65a	UW-63	120		
MC-75a~100a	UW-95	325		

7] Accessories

Magnetic Switches

Surge Unit

It absorbs the surge arisen out of the coil of the contactor.
It can be installed simply to the contactor.



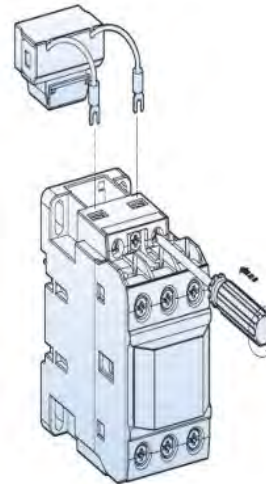
Rated operation voltage (Ue): AC 24~440V
DC 24~220V



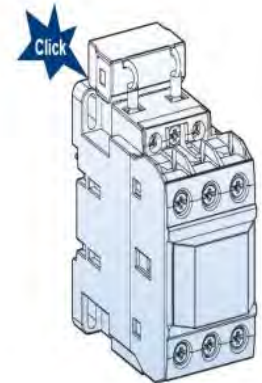
Rated impulse withstand voltage (Uimp): 8kV



Degree of protection: IP20



Installation



7] Accessories

Magnetic Switches

Replacement Coils

To replace the existing coil to change voltage or repair.



Contactor	Coil Voltage							
	AC coil						DC coil	
	AC 60Hz(V)		AC 50HZ (V)		AC 50/60Hz(V)		DC (V)	
MC-6a MC-9a MC-12a MC-18a								
MC-9b	24	230	24	230	24	240	12	110
MC-12b	48	240	36	240	48	390	20	125
MC-18b	100	277	42	380	100	415	24	200
MC-22b	110	380	48	400	110	440	48	220
	120	440	80	415	120	500	60	250
MC-32a	200	480	100	440	200	550	80	
MC-40a	208	600	110	500	220		100	
	220		220	550	230			
MC-50a MC-65a								
MC-75a MC-95a MC-100a								
MC-130a MC-150a AC/DC Common COIL		-		-	24 48 110 220 100~240/100~220	300 400 500	24 48	110 220

7] Accessories

Magnetic Switches

Replacement Coils

To replace the existing coil to change voltage or repair.



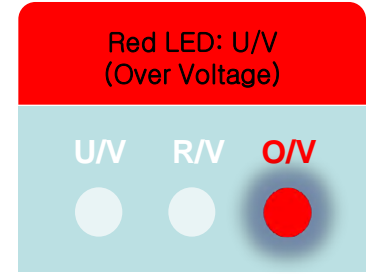
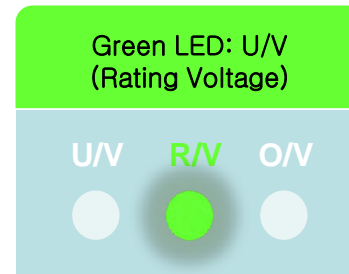
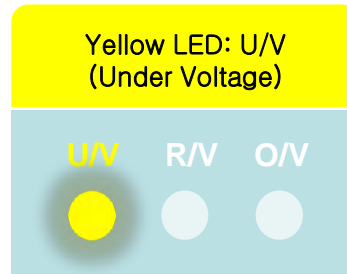
Contactor	Coil Voltage	
	AC/DC Common coil	AC coil
MC-185a MC-225a	24 48 100~240/100~220	300 400 500
MC-265a MC-300a MC-400a	100~240/100~220	300 400 500
MC-500a MC-630a MC-800a	100/100 200/200	300 400 500

7] Accessories

Magnetic Switches

LED voltage monitoring contactor

Real time observe coil voltage without additional equipments for protect coil burn out due to the under and over voltage



Type	Coil voltage	LED indicate statue		
		Under Voltage (Yellow)	Rating Voltage (Green)	Over Voltage (Red)
MC-130a MC 150a	110V	~80V	80~130V	130V~
	220V	~160V	160~260V	260V~
	400V	~330V	330~480V	280V~
MC-185a MC-225a	110V	~80V	80~130V	130V~
	220V	~160V	160~260V	260V~
	400V	~330V	330~480V	280V~
MC-265a MC-330a MC-400a	110V	~80V	80~130V	130V~
	220V	~160V	160~260V	260V~
	400V	~330V	330~480V	280V~
MC-500a MC-630a MC-800a	110V	~80V	80~130V	130V~
	220V	~160V	160~260V	260V~

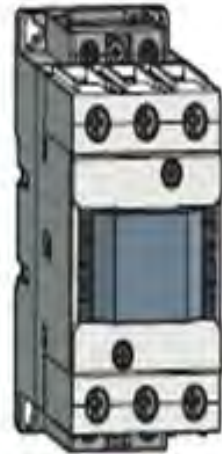
•The accuracy of LED indicate statue is $\pm 5\%$

7] Accessories

Magnetic Switches

Safety Cover (Option)

-  To prevent arc from coming out from the contactor
-  To protect from unintended manual operation
-  To prevent dust from entering into the inside of the contactor



Type	Contactor
AP-9	MC-6a~150a
AP-185	MC-185a~800a

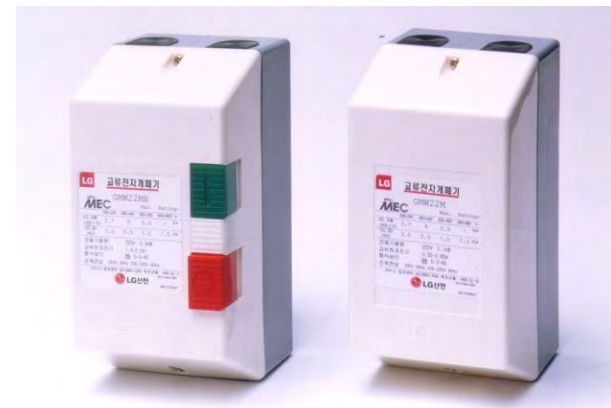
7] Accessories

Magnetic Switches

Enclosure

- 1] Performance
- 2] Structure
- 3] Numbering system
- 4] Range & Frame
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Type	Model	Remark
Metal enclosure without button	MW-6a~100a	
Metal enclosure with button	MW-6aB~100aB	On-Off button
Plastic enclosure without button	MW-6aM~22bM	
Plastic enclosure with button	MW-6aMB~22bMB	On-Off button



7] Accessories

Magnetic Switches

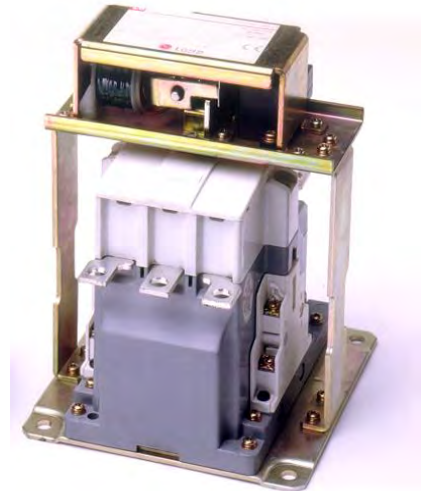
Latch Unit

- 1] Performance
- 2] Structure
- 3] Numbering system
- 4] Range & Frame
- 5] Specification
- 6] Features
- 7] **Accessories**
- 8] Certificates

Latch unit device

The mechanical latch unit maintains the main contacts in the closed condition after the coil power has been removed.

Main contacts are opened via the rebound coil.



7] Accessories

Magnetic Switches

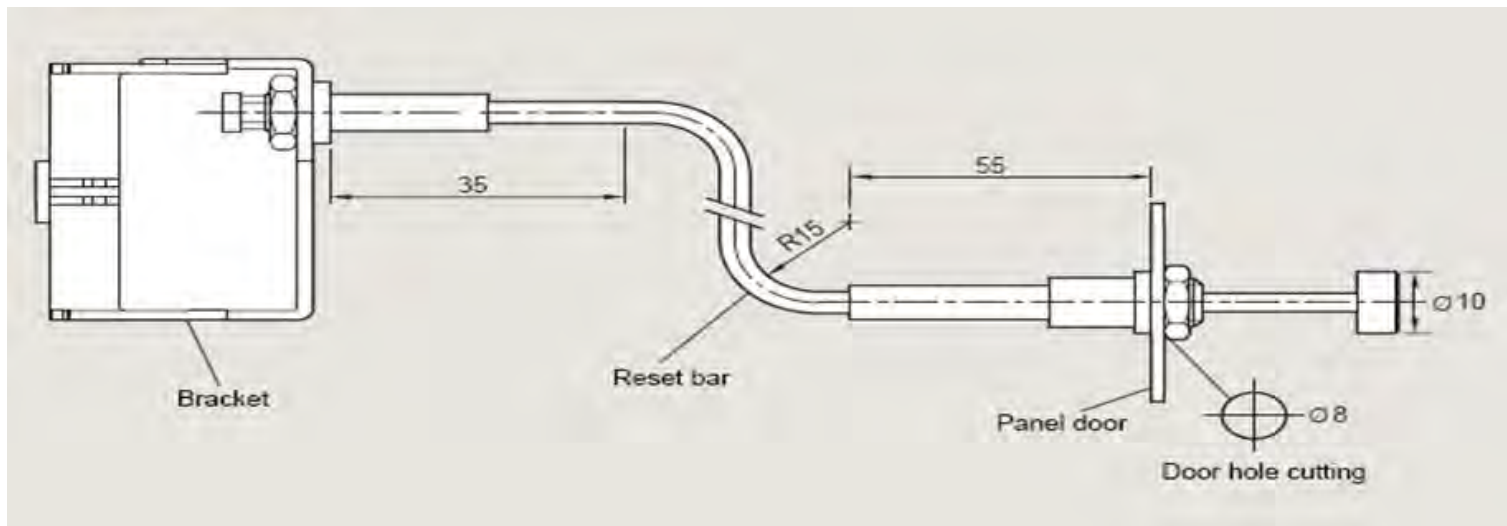
Remote reset Unit

These accessories are used to reset the relays on the panel door



Type	Cable length (L)
UM-4R	400 mm
UM-5R	500 mm
UM-6R	600 mm

1. Make the reset bar straight at least 55mm from the panel door and 35mm from the bracket.
2. The bending radius of the flexible reset bar should not be less than 15mm.



7] Accessories

Magnetic Switches

Separate Mounting Unit For TOR

These accessories are used to mount the relays separately from contactors. If a relay is combined with a unit, it can be mounted on DIN rail or panel by fixing screws.



Relay	Unit	
	Type	Weight
MT-12/2H□ MT-12/3H□ MT-12/3K□ MT-12/3D□	UZ-12	35g
MT-32/2H□ MT-32/3H□ MT-32/3K□ MT-32/3D□	UZ-32	68g
MT-63/2H□S MT-63/3H□S MT-63/3K□S MT-63/3D□S	UZ-63/S	134g
MT-95/2H□S MT-95/3H□S MT-95/3K□S MT-95/3D□S	UZ-95/S	230g
MT-150/2H□ MT-150/3H□ MT-150/3K□ MT-150/3D□	UZ-150/S	284g

8] Certificates

Magnetic Switches

- KEMA approval (Applied Standard IEC 60947-4)
- UL listed (UL508,CSA)
- Marine approval (LR, BV, NK, KR, GL, RINA, ABS, DNV)

1] Performance

2] Structure

3] Numbering system

4] Range & Frame

5] Specification

6] Features

7] Accessories

8] Certificates

