

Technical data

General

		MC1...	MC2...
Rated thermal current $I_{th} \theta \leq 60^{\circ}C^{(1)}$	(A)	20	20
Rated operational current $I_e^{(2)}$ (3 x 440V, 50/60Hz, AC-3)	(A)	9	12
Maximum number of poles		4	4
Rated insulation voltage U_i	(V)	750	750
Rated operational voltage U_e	(V)	690	690

(1) Insulated terminal type B 2.8x0.8 with wire 1mm²:

$I_e = 8A$, design DIN 46 247

(2) Max. operational current AC3, 3 -phase $\leq 440V$, according to IEC 947-4-1

Conformity to standards

IEC/EN 60947-1	CSA C22.2/14	SEV 10254
IEC/EN 60947-4-1	CENELEC HD 419	JIS C8325
IEC/EN 60947-5-1	VDE 0660	JEM 1038
EN 50003	NFC 63110	NEMA ICS-1
EN 50005	BS 4794	UL 508
EN 50012		

Approvals

cULus	NEMKO	SEMKO
SETI	DEMKO	RINA
IMQ		
Lloyd's Register	Bureau Veritas	CE

Ambient conditions

Storage temperature	-55°C to +80°C	
Operation temperature	-40°C to +55°C	
Altitude	up to 3000m	Nominal values
	from 3000 up to 4000m	90% I_e 80% U_e
	from 4000 up to 5000m	80% I_e 75% U_e

Climatic resistance

Continuous tests 40 / 125 / 56		
Cold (72h)		
Temperature	-40°C	
Dry heat (96h)		
Temperature	+125°C	
Relative humidity	<50%	
Humid heat (56h)		
Temperature	+40°C	
Relative humidity	95%	
Cyclic tests		
First half-cycle (12h)		
Low temperature	+25°C	
Relative humidity	93%	
Second half-cycle (12h)		
Low temperature	+55°C	
Relative humidity	95%	
Number of consecutive cycles	6	

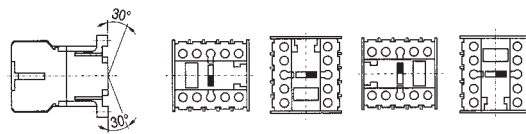
Shock resistance (IEC 68-2-27)

Continuously closed (at 0.8Us)	
Admissible acceleration	25g
Impulse duration	11 ms
Continuously opened (no voltage)	
Admissible acceleration	20g
Impulse duration	11 ms

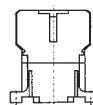
Vibration resistance (IEC 68-2-6)

Continuously closed (at 0.8Us)	
Admissible acceleration	15g
Sweep between	10 - 200Hz
Continuously opened (no voltage)	
Admissible acceleration	5g (AC) - 35g (DC)
Sweep between	10 - 200Hz

Mounting positions



With the same pick-up and drop-out voltage
With the same rated power



-7% of connection voltage
+4% of disconnection voltage
With the same rated power



7% of connection voltage
+4% of disconnection voltage
With the same rated power

Terminal capacity

Terminal with M3.5 screw (with pozidrive head and safety flange)	Tightening torque
Solid wire	mm ² 0.75 to 2x2 w.
Flexible wire without terminal	mm ² 0.75 to 2.5x2 w.
Flexible wire without terminal with cap	mm ² 0.75 to 2.5x1 w.
Ring terminal	mm ² 0.75 to 1x2 w.
	0.8Nm - 7 Lb/in
Faston terminal 2.8 - 2 insulated terminals	mm ² 1x2w.
Terminal for printed circuit (Ø of PCB hole)	1.8mm
Ring terminal cap	7.8mm
Fork terminal cap	6.5mm

Control circuit

			MC_A...	MC_C...	MC_I...	MC_K...	MC_C...W
Rated insulation voltage (Ui)	(V)		750	750	750	750	750
Standard voltages (Us)							
50Hz(V)			24 ... 690	-	-	-	-
60Hz(V)			6 ... 600	-	-	-	-
DC	(V)		-	6 ... 440	24	24	12 ... 440
Operating voltages limits							
Operating ^[1]	xUs		0.8 ... 1.1	0.8 ... 1.1	0.8 ... 1.25	0.7 ... 1.25	0.7 ... 1.3
Drop-out	xUs		0.35 ... 0.55	0.15 ... 0.4	0.15 ... 0.3	0.15 ... 0.35	0.15 ... 0.3
Operating voltages limits with coil 50/60Hz							
Operating	xUs		0.8 ... 1.1	-	-	-	-
Drop-out	xUs		0.35 ... 0.55	-	-	-	-
Consumption							
50 or 60Hz - monofrequency coil							
Pick-up	(VA)		26	-	-	-	-
Seal	(VA)		4	-	-	-	-
50/60Hz - bifrequency coil							
Pick-up	(VA)		32	-	-	-	-
Seal	(VA)		6	-	-	-	-
DC	(W)		-	3	1.2	2	4
Power factor							
Magnetic circuit open	(cos φ)		0.8	-	-	-	-
Magnetic circuit closed	(cos φ)		0.35	-	-	-	-
Power dissipation	(W)		1.4	3	1.2	2	4
Opening and closing times							
Values between ±%Us			+10 ... -20	+10 ... -20	+25 ... -30	+25 ... -30	+30 ... -30
Time on energisation NO	(ms)		6 ... 13	22 ... 36	30 ... 70	20 ... 50	17 ... 28
Time on de-energisation NC	(ms)		8 ... 16	9 ... 12	9 ... 16	9 ... 16	9 ... 12
Time on energisation NC	(ms)		5 ... 11	18 ... 27	20 ... 45	18 ... 35	12 ... 25
Time on de-energisation NO	(ms)		6 ... 13	5 ... 7	5 ... 9	5 ... 9	5 ... 7
Values at Us							
Time on excitation NO	(ms)		7 ... 12	24 ... 27	25 ... 45	25 ... 40	11 ... 23
Time on desexcitation NC	(ms)		8 ... 16	9 ... 11	9 ... 16	9 ... 16	9 ... 11
Time on excitation NC	(ms)		6 ... 10	20 ... 26	25 ... 35	20 ... 30	15 ... 21
Time on desexcitation NO	(ms)		6 ... 13	5 ... 8	5 ... 9	5 ... 8	5 ... 8
Maximum time without voltage	(ms)		3	3	3	3	3
Mechanical endurance							
Monofrequency coil	10 ⁶ ops.		>15	-	-	-	-
Bifrequency coil	10 ⁶ ops.		>10	-	-	-	-
DC	10 ⁶ ops.		-	10	10	10	10
Maximum rate							
No load	Monofrequency coil	ops./h	9000	-	-	-	-
	Bifrequency coil	ops./h	3600	-	-	-	-
	DC	ops./h	-	9000	9000	9000	9000
AC1 and AC3 (at rated power)		ops./h	1200	1200	1200	1200	1200
AC4 (at rated power)		ops./h	300	300	300	300	300

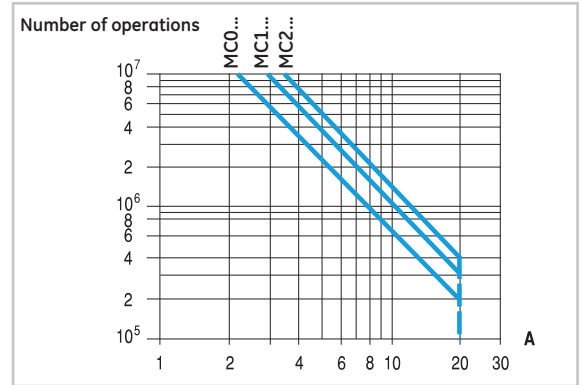
Main circuit (poles)

		MC1...	MC2...
Rated insulation voltage (Ui) (acc. IEC 947-4)	(V)	750	750
Rated thermal current (Ith) $\theta \leq 60^\circ$ [1]	(A)	20	20
Frequency limits	(Hz)	0...400	0...400
Making capacity (r.m.s.) $U_e \leq 690V$ 50/60Hz	(A)	160	160
Breaking capacity (r.m.s.) $U_e \leq 440V$	(A)	106	106
$U_e = 500V$	(A)	90	90
$U_e = 690V$	(A)	80	90
Short-time current			
0.3 sec.	(A)	470	470
1 sec.	(A)	250	250
5 sec.	(A)	125	125
10 sec.	(A)	95	95
30 sec.	(A)	70	70
1 min.	(A)	50	50
3 min.	(A)	40	40
Recovery time	min.	10	10
Protec. against short-circuits (IEC 947-4), w/o TOR			
Coordination type "1" gL/gG	(A)	32	32
Coordination type "2" gL/gG	(A)	20	20
w/o welding contacts gL/gG	(A)	16	16
Circuit breaker rating (curve G CEE 19.1)		20	20
Impedance per pole	(m Ω)	1.5	1.5
Power dissipation per pole			
AC1	(W)	0.6	0.6
AC3	(W)	0.128	0.228
Insulation resistance			
Between adjacent poles	(M Ω)	> 10	> 10
Between pole and earth	(M Ω)	> 10	> 10
Between input and output	(M Ω)	> 10	> 10
Guaranteed no overlap between NO and NC contacts			
Space	(mm)	1	1
Time	(ms)	> 2	> 2

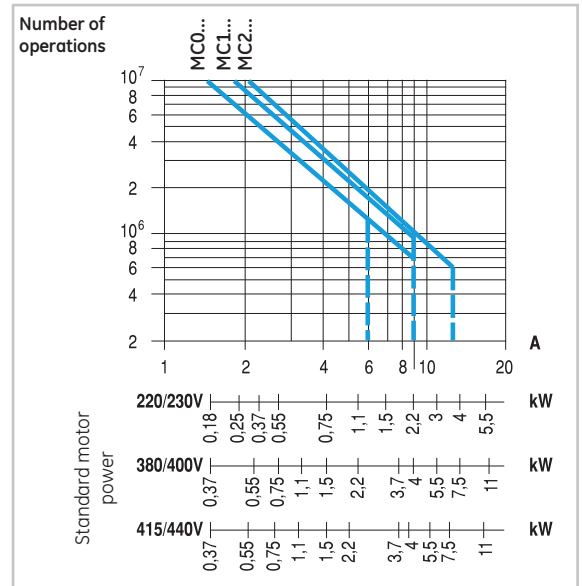
(1) Insulated terminal type B 2.8x0.8 with wire 1mm² Ie = 8A acc. to DIN 46247

Electrical endurance

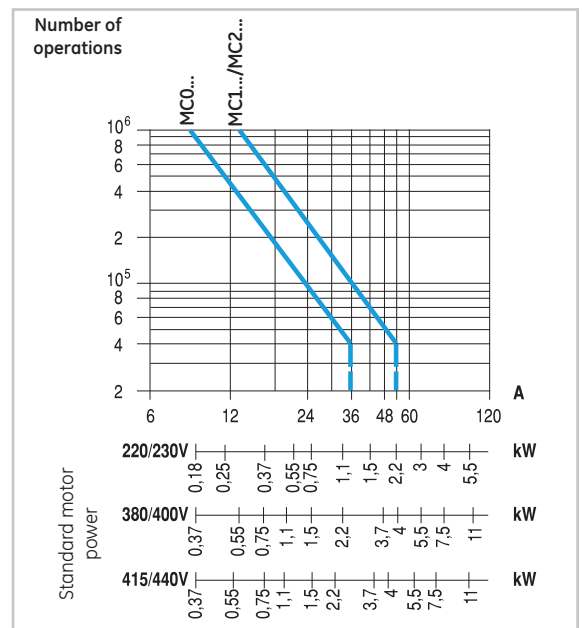
Category AC1



Category AC3



Category AC4

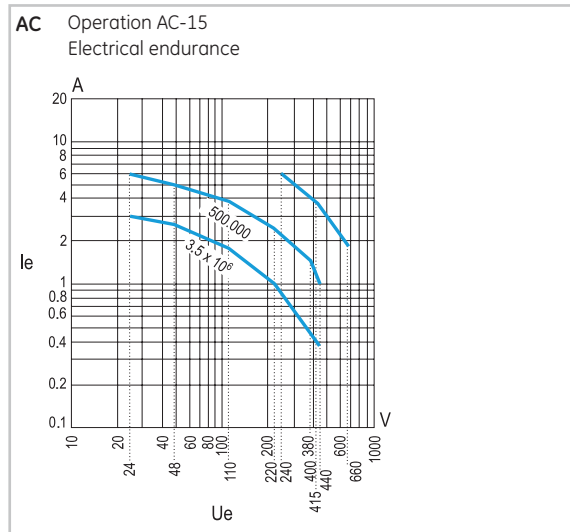


Internal auxiliary contacts

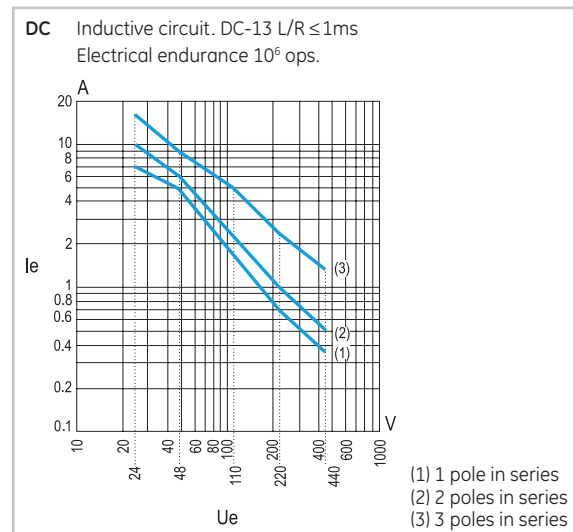
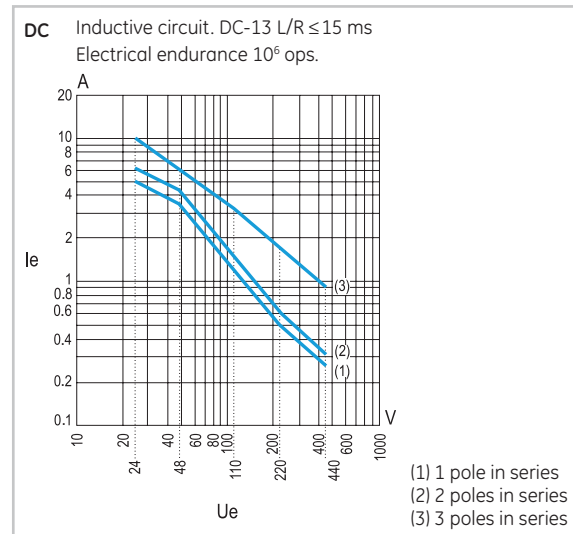
		MC1 / MC2
Rated insulation voltage (Ui) IEC 60947-5	(V)	750
Rated thermal current (Ith) $\theta \leq 60^{\circ}\text{C}^{(1)}$	(A)	16
Making capacity according with IEC 60947-5-1		
Ue ≤ 690 50-60Hz	(A)	160
Ue $\leq 440\text{V DC}$	(A)	160
Breaking capacity (r.m.s.) IEC 60947-5-1		
AC-15		
Ue $\leq 440\text{V} / 50-60\text{Hz}$	(A)	106
DC-13		
Ue $\leq 110\text{V DC}$	(A)	3
Ue = 220V DC	(A)	1.2
Ue = 48V DC	(A)	10
Minimum operational power (operational safety)		5mA, 17V
Short-circuit protection (max.class gI fuse) w/o welding	(A)	10
Insulation resistance		
Between adjacent contacts	(M Ω)	> 10
Between contacts and earth	(M Ω)	> 10
Between input and output	(M Ω)	> 10
Guaranteed no overlap between NO and NC contacts		
Space	(mm)	0,5
Minimal time	(ms)	> 2
Impedance	(m Ω)	2,3
Terminal capacity		Same as main circuit

(1) Insulated terminal type B 2.8 x 0.8 with wire 1mm² Ie = 8A acc. with DIN 46247

AC characteristics



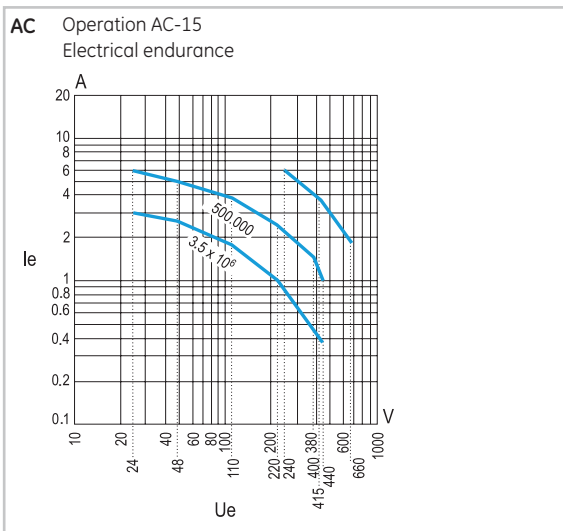
DC characteristics



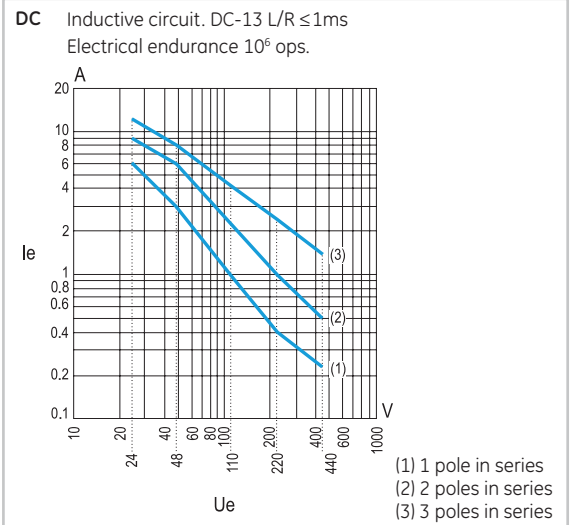
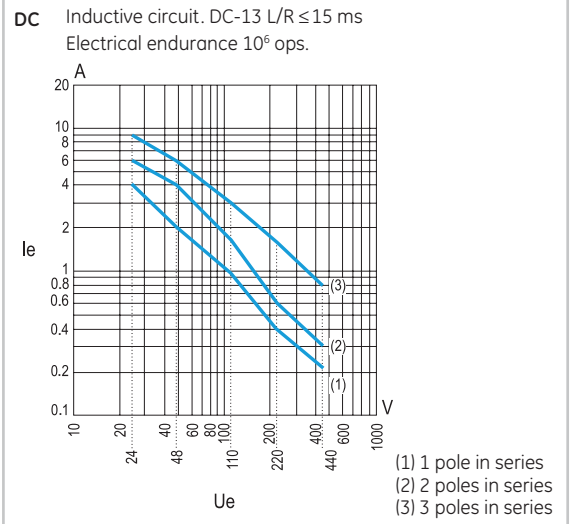
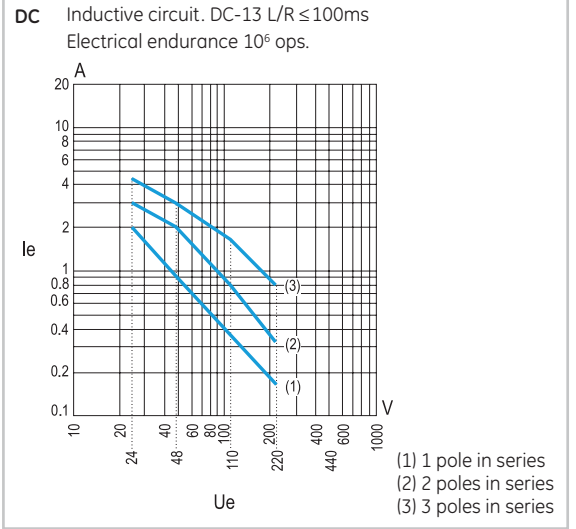
Instantaneous auxiliary contact blocks

		MACN..., MACL...
Rated insulation voltage (Ui) acc. IEC 60947-1	(V)	750
Rated thermal current (Ith) $\theta \leq 60^\circ\text{C}^{[1]}$	(A)	10
Making capacity (r.m.s.) according with IEC/EN 60947-5-1		
AC-15	Ue $\leq 220\text{V } 50/60\text{Hz}$	(A) 73
	Ue = 380V 50/60Hz	(A) 38
	Ue = 690V 50/60Hz	(A) 22
DC-13 L/R=100ms	Ue $\leq 100\text{V DC}$	(A) 2.6
	Ue = 220V DC	(A) 1
	Ue = 440V DC	(A) 0.6
Breaking capacity (r.m.s.) acc. IEC/EN 60947-5-1		
AC-15	Ue $\leq 220\text{V } 50/60\text{Hz}$	(A) 73
	Ue = 380V 50/60Hz	(A) 38
	Ue = 690V 50/60Hz	(A) 22
DC-13 LR=100ms	Ue $\leq 100\text{V DC}$	(A) 2
	Ue = 220V DC	(A) 0.8
	Ue = 440V DC	(A) 0.4
Rated voltage and rated current Ue-Ie		
AC-15	according to IEC 60947	120V - 6A
		230V - 6A
		400V - 4A
		500V - 1A
		600V - 1A
		A600
DC-13	according to IEC 60947	24V - 4A
		48V - 2A
		110V - 0.7A
		220V - 0.3A
		440V - 0.1A
		Q600
	according to UL, CSA	
Minimum operational power (operational safety) 5 mA, 17V		
Short-circuit protection (A) 10		
(max. class gI fuse) w/o welding		
Insulation resistance		
	Between adjacent contacts (M Ω)	> 10
	Between contacts an earth (M Ω)	> 10
	Between input and output (M Ω)	> 10
Guaranteed no overlap between NO and NC contacts		
	Space (mm)	0.5
	Minimal time (ms)	> 2
Impedance (m Ω) 2.4		
Terminal capacity Same as main circuit		
(1) Insulated terminal type B 2.8x0.8 with wire 1mm ² Ie = 8A acc. with DIN 46247		

AC characteristics

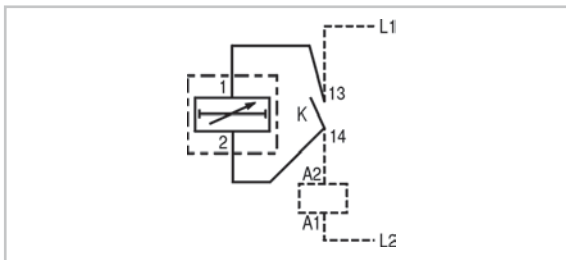


DC characteristics



Electronic timer block




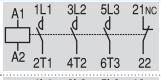

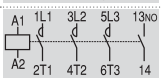


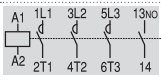

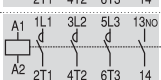
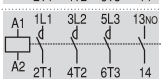

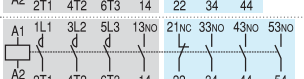


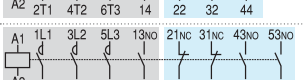


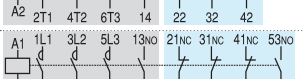

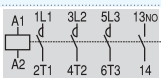

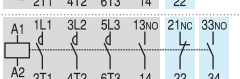
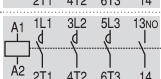
		MREBC...
Rated insulation voltage (Ui)	(V)	750
Rated thermal current (Ith) $\theta \leq 60^{\circ}\text{C}^{\text{U}}$	(A)	0.55
Supply voltage (AC and DC)	(V)	24 to 250
Operating limits		0.80 to 1.1 Us (0.85 to 1.1 Us to 12V)
Voltage drop	(V)	< 3
Maximum load current at :		
20°C	(A)	0.9
40°C	(A)	0.72
60°C	(A)	0.55
Minimum load for safe operation	(A)	> 10
Maximum current	(A)	10A per 40ms
Leakage current at 220V	(mA)	< 5
Operational current		
AC-15	(A)	0.7
DC-13	(A)	0.9
Timing range (delay ON)	(s)	0.5 to 60 ($\pm 6\text{s}$)
Rearrangement time	(ms)	< 100
Repeatability (accuracy) (%)		± 1
Ambient temperature		
storage	(°C)	-55 to + 80
operation	(°C)	-5 to + 60
Degree of protection		IP20
Mounting positions		Any
Terminals: 2 free cables		1mm ² (AWG 17) 250mm



Contact sequence

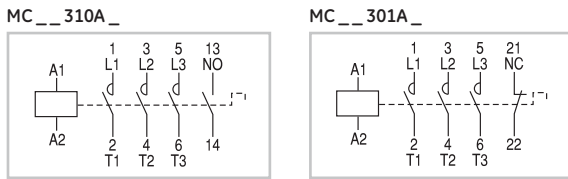
	Main contact (NO)	Main contact (NC)	Auxiliary contact (NO)	Auxiliary contact (NC)
Three-pole minicontactor				
MC...310...	0 2 3.5		0 2.3 3.5	
MC...301...	0 2 3.5			0 1.2 3.5
Four-pole minicontactor				
MC...400...	0 2 3.5			
MC...B00...	0 2 3.5	0 1.2 3.5		
MC...A00...		0 1.2 3.5		
Auxiliary contact block				
MAC...			0 2.1 3.5	0 1 3.5
MAR...			0 2.1 3.5	0 1 3.5

Terminal numbering in accordance with EN 50012

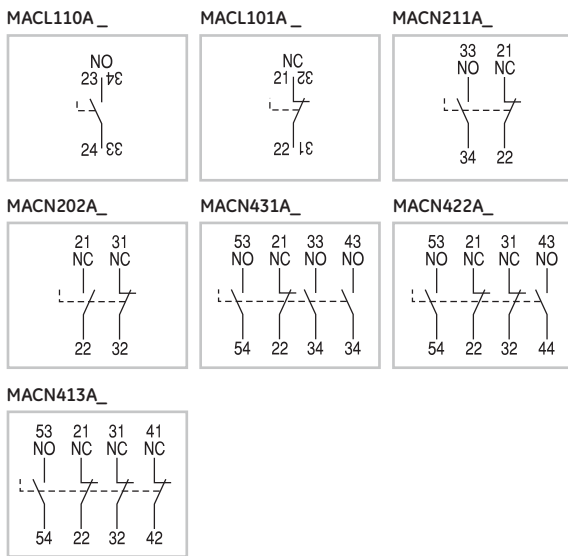
Final structure of the contactor	Auxiliary contactors		Possible basic contactors + Auxiliary contact blocks to be added	
	Combination	 		
	Description			
Without auxiliary contact blocks				
 	01E	0 1	MC_A301A...	
 	10E	1 0	MC_A310A...	
Auxiliary contact blocks front mounted with two or four contacts				
		11E	1 1	MC_A310A... + MACN211A
		21E	2 1	MC_A310A... + MACN211A
		12E	1 2	MC_A310A... + MACN202A
		31E	3 1	MC_A310A... + MACN431A
		41E	4 1	MC_A310A... + MACN431A
		22E	2 2	MC_A310A... + MACN422A
		32E	3 2	MC_A310A... + MACN422A
		13E	1 3	MC_A310A... + MACN413A
		23E	2 3	MC_A310A... + MACN413A
	Auxiliary contact blocks lateral mounted with one contact			
		11E	1 1	MC_A310A... + MA101A
		21E	2 1	MC_A310A... + MA101A + MA110A
		12E	1 2	MC_A310A... + MA101A + MA101A

Wiring diagrams

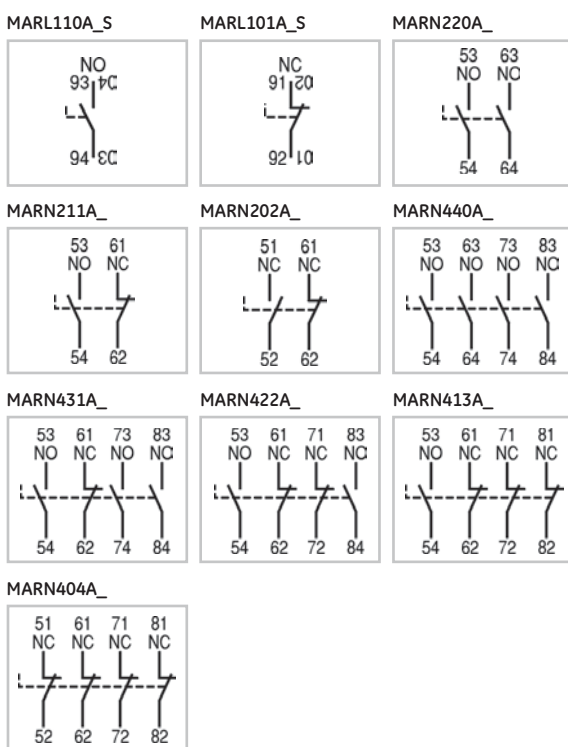
Basic three-pole contactors. (EN 50012)



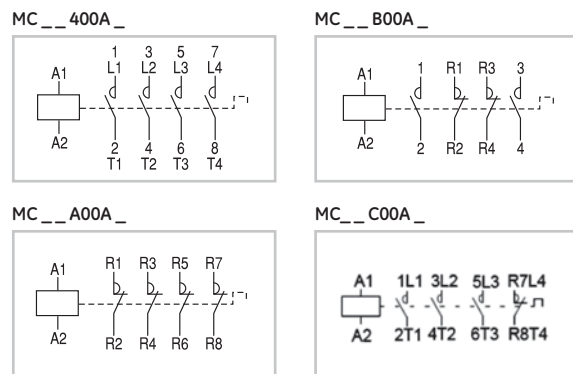
Instantaneous auxiliary contact blocks. (EN 50012)



Instantaneous auxiliary contact blocks. (EN 50005)



Base four-pole contactors. (EN 50005)



Instantaneous auxiliary contact blocks. (EN 50005)

